Smart Kitchen Trolley

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Abstract

In the current era almost every home has an LPG cylinder in their kitchen. The LPG cylinder is not only used in homes but also in restaurants for cooking food. The major issue with these LPG cylinders are that they do not show the amount of gas remaining in the cylinder also they do not show the daily consumption of the gas. The proposed system is IoT based System which consist of different sensors like force load cell weight sensor, flame detector fire sensor, MQ6 gas sensor for detecting parameters like weight of the gas, for detecting fire, and for detecting gas leakage respectively. System consists other components like battery for the power supply, buzzer to alert the user. Data sensed by the sensors is stored to the cloud which can be retrieved and visualized through smart phone application. It also shows the daily consumption of the gas by the user and notify the user on the mobile application. The system ensures safe and controlled usage of the LPG gas cylinder.

Key words*: IoT, Gas Leakage Detection, Fire Detection, Monthly Gas Usage Analysis, Automatic Gas Booking.*

INTRODUCTION

An LPG cylinder can be found in almost every Indian household, it is impossible to imagine daily life without it. Given its widespread use, we come across of cases where LPG cylinders explode, causing grievous injury and even death. While there have been tremendous improvements when it comes to safety standards but accidents can occur anytime.

Recently, India has topped Japan to become the second highest importer of LPG to meet the increasing demands of LPG cylinder in India. LPG is the most widely used cooking fuel however there is limited control on the usage of LPG cylinder. Safety is also a major concern when it comes to LPG gas cylinders. According to statistics of National Crime Records Bureau ***(***NCRB***)*** show that 586 people died in Tamil Nadu because of explosion of cooking gas cylinders. Gujarat registered 735 such deaths. Tamil Nadu tops the southern states in the category, far above Andhra Pradesh ***(42)***, Karnataka ***(***386***)*** and Kerala ***(52)***.This means more than 10 people in Tamil Nadu die every week because of gas cylinder explosions. In the whole, there have been 632 such accidents last year. In Chennai, 91 people died in 96 LPG cylinder accidents.

There have been a number of faulty cylinders that have been distributed by numerous LPG companies and this has been raising concerns. These companies have received over a 100 faulty cylinders and regulators so far in Nasik district. 67 complaints have been received regarding cylinders and 42 complaints have been received

regarding leaked regulators in the second quarter of the calendar year. LPG companies have over 11 lakh gas connections in Pune district and this number is increasing. Customers are also irritated by the delay in receiving refill cylinders even after having booked one. Individuals have complained that delivery has been unpredictable.

Another issue about gas is, we use gas on a daily basis but don' t realized what amount of gas we have used efficiently or have rather wasted it. So, given the daily statistics of the amount of gas consumption allow the user to see when and how gas was utilized. This make the user to help further steps as to avoid wastage of gas usage in the area where the wastage could have been avoided. It is essential to know the user about how much gas they used in daily, weekly or a monthly basis. If the user come to know how much gas they used or how much gas is remaining in the gas cylinder then issues like delayed in gas booking, waiting for gas refiling are avoided and we also achieving the control usage of gas by user.

Problem statement

To implement the " Smart Gas Alert System" .Today almost every rural and urban house has the LPG cylinder in their kitchen. The LPG cylinder is used in house as well as in restaurants for various purposes. The major issue with these LPG cylinders is that they do not show the daily consumption of the gas cylinder. Many times due to gas leakage in house and restaurant, gas blast incidence can occur in house as well as in restaurants. As per the website survey 17 to 18% people are dead due to the gas blast per year. So these things are happening due to the loose gas connections, improper regulator deployment, and gas pipe cutting. People don' t have an idea about exact gas utilization and gas status. After blast fire event will be generated but we can' t predict the intensity of fire at that time. This is the very serious issue in rural and urban area.

Literature survey

3.1 Reference papers

1. Design and Implementation of an Economic Gas Leakage Detector This project developed system to detect the gas leakage and providing immediate alarm or intimation to the user.
Advantage: This provides a cost effective audio visual solution for LPG leakage detection. Audibly alert the users of those premises in case of a hazardous situation and provide warning signals (beeps).
Disadvantage: They are strongly dependent on the noise of pressure/ temperature measurements. Reliability issues of gas leakage detectors were addressed in.

2. LPG Gas Monitoring And Automatic Cylinder Booking With Alert System These report focus on detection of economic fuels like petroleum, liquid petroleum gas, alcohol, etc., and alert the surrounding people about the leakage through SMS. It also sense surrounding temperature, so that no fire accidents occurs. The one more important feature is automatic cylinder booking by noticing the current expenditure of LPG gas in our daily life.
Advantage: Automatic cylinder booking by noticing the current expenditure of LPG gas in our daily life.
Disadvantage: If room temperature exceeds threshold value then also turn on the alarm or buzzer.

3. Smart Gas Level Monitoring, Booking Gas Leakage Detector This system is an effective affirmative way of monitoring the gas quantity in the container, and to intimate as well as to place an refill order in the respective branch office(gas agency), via an message by means of internet through IoT module.
Advantage: It plays a major role in the security / avoidance of accidents to the user and helps in leading an easy life.
Disadvantage: Temperature sensor which will detect the surrounding environment for any chance of error.

4. Gas Leakage Detection And Smart Alerting System Using IoT This system will be able to detect the gas in environment using the gas sensors. This will prevent form the major harmful problem. **Advantage:** To create awareness about the reducing weight of the gas in the container
Disadvantage: This application does not provide a cost effective and highly accurate system.

5. IoT Based Gas Pre Booking and Gas Leakage Detection Using IBM Server This reduce the frequent monitoring of the gas weight. Also there is no need to remember the consumer number and their details
Advantage: The security level of the home can be increased by detecting any LPG gas leakage if any and sending an alert.
Disadvantage: This system can be implemented or used for home only.

6. Design and Implementation of Gadgets for Automatic LPG Reservation and Meter Pricing
Design And Implementation of gadgets for automatic LPG reservation and meter pricing is the technology of automatically collecting data from energy metering devices (water, gas, and electric) and transferring that data to a central database for billing and/or analysing.
And also monitoring level of the LPG cylinder. **Advantage:** Gas and electric energy is the most valuable commodities all around the world, so this technique very helpful to save the energy.
Disadvantage: These techniques used on electricity monitoring are simply not applicable for gas with regard to practical, regulatory and health and safety issues.

7. LPG Gas Detection and Controlling Using Gas Sensor
In this system, different gas sensing technologies is used to sense the leakage of LPG gas. LPG gas leakage is detected using semiconductor gas sensor.
Advantage: LPG gas detection messages are sent to owner and security
Disadvantage: There is no control action taken which puts the human into risk and if the wiring of an exhaust fan is not proper it may cause an explosion.

8. GASBO for LPG Gas Detection and Controlling Using Mobile App
This project is embedded based project. A Gas sensor is used to detect gas leaks in the kitchen or near the gas heater. The sensor can also sense LPG and Coal Gas as well as an Ideal sensor for use to detect the presence of an LPG leak in your car or in a service station, storage tank environment.
Advantage:
1. It is utilized in the house as LPG leakage detection.
2. It also detects alcohol so it is used as liquor tester. 3. The sensor has excellent sensibility combined with quick fast response time.
4. The system is highly credible, tamper-proof and secure.
5. It is possible to get an instantaneous result and high accuracy.
Disadvantage:
1. The motor will continually rotate around the cylinder to detect the gas leakage.
2. An alert message will be sent to the people those who have registered in the gas App. So if they are nearby could take necessary action to prevent an eruption.

9. A Security Alert System Using GSM for Gas Leakage
When concentration of gas exceeds microcontroller automatically alert the consumer by sending SMS and activate the LED, Buzzer and display the message on LCD display.
Advantage: In the long run, the maintenance cost is very less when compared to present system.
Disadvantage: The gas monitoring system as well as the last implementation, which challenges were met due to complicated installation environment, misunderstanding of candidates, and the lack of inexperienced fitters.

10. Design And Implement Gas Alert System The gas sensor which is designed to interface with microcontroller and continuously monitor the gas leak in the air sends this information to the microcontroller.
Advantage: Alert the people by sending the message and alert the people at home by activating the LED, Buzzer and take the necessary action of preventing the gas leakage.
Disadvantage: Its sensitivity depends on Humidity and Temperature.

Proposed System

" Smart Gas Alert System (SGAS)" which regularly notifies the user about the amount of gas consumption as well as provides alerts in case of fire or leakage. The proposed system shows the daily and weekly and monthly consumption of the gas to the user. This system helps to detect and send notification of gas leakage, fire event, and

statistics of weekly and monthly usage of gas, gas weight level to the users. Users can easily access data using android app which is retrieved through cloud server.

The proposed system shows the amount of remaining gas in the LPG cylinder, it also shows the daily consumption of the gas by the user. Our system uses various sensors like force load cell weight sensor, flame sensor, gas sensor. Using these sensors we can detect fire as well as gas leakage and notify the user triggering the buzzer and LED. The sensed data by sensors will be sent to controller and further it will be stored on cloud.

There is a need of a system which informs the user about the current level of the gas in LPG cylinder so that user will be able to book the new cylinder before the current cylinder gets empty. Situation like sudden emptiness of the cylinder can be avoided by using this system. The proposed system shows statistics of daily, weekly, monthly of gas usage to the user which in turn makes the user aware of the usage of the gas so that in future he can avoid the excess gas consumption. If the gas in the LPG cylinder is below the threshold then the user will be notified to book a new gas cylinder on his mobile application.

In the proposed system the user will be notified by SMS and Buzzer will be triggered if the gas leakage or fire is detected. The system will also alert the fire brigade by sending the location where the fire event is occurred.

Fig 1: Smart Gas Trolley with GAS

Fig 2: Smart Gas Trolley

Objectives

- To give daily statistics of gas consumption to user.
- Automatic booking of gas cylinder by user' s authentication.
- To alert the user when there is a gas leakage.
- If fire is detected send message to fire brigade with location.
- To provide the current location of the user.
- To provide services to the gas agencies.

System Architecture

In the below architecture, different type of sensors such as MQ6 Gas Sensor, Flame Sensor, Load Cell Sensor and Temperature Sensor are connected to the controller for processing the data and stored in the cloud. Gas Sensor checks the gas leakage continuously and if gas will leak then turn on the buzzer and LED and it will send alert SMS to the user or family members. Flame sensor detects fire, if fire will occurred then it will send alert SMS to the user or family members and also send current location to the fire brigade. Load Cell is used to detect the weight of the cylinder through which user came to know the remaining gas in the cylinder and daily usage of the gas on their android application.

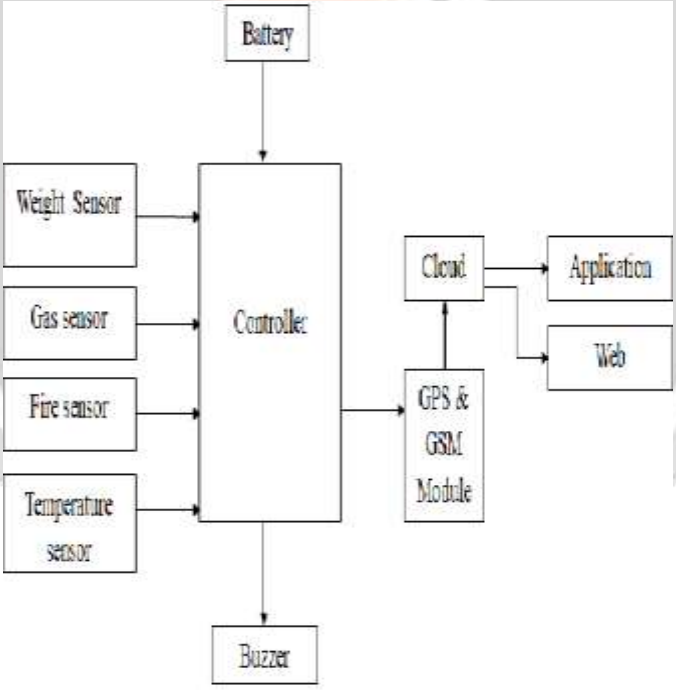

Fig 3: Architecture of Smart Gas Alert System

Flow Chart

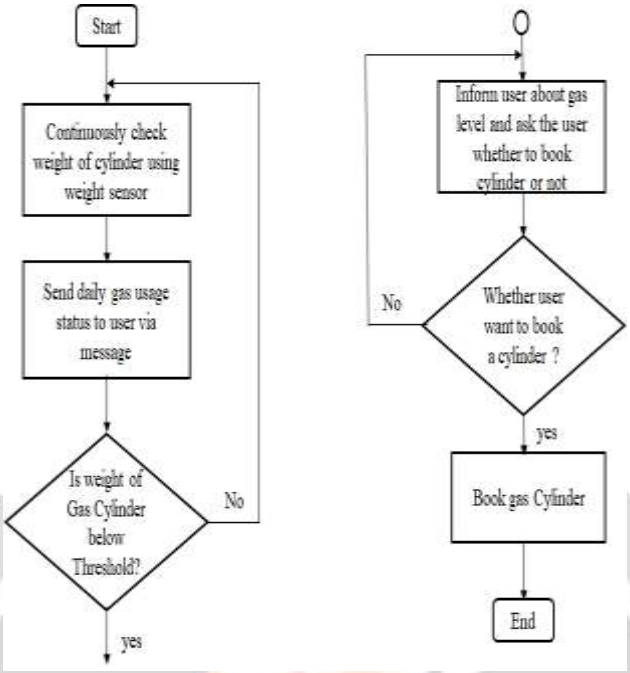

Fig 4: Data flow Diagram of Smart Gas Alert System

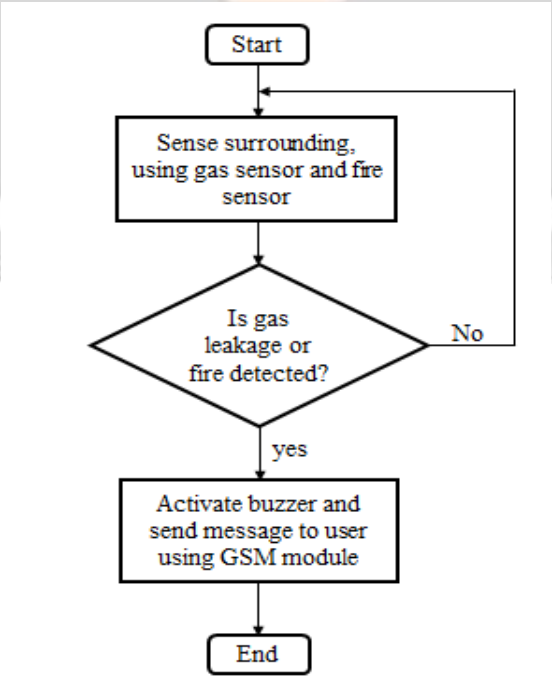

Fig 4: Data flow Diagram of Smart Gas Alert System

Results

After testing all the Sensors :

- Fire was detected from temperature and flame sensor.
- Gas leakage was detected from gas sensor.
- Weight of the cylinder was detected from load cell sensor**.**

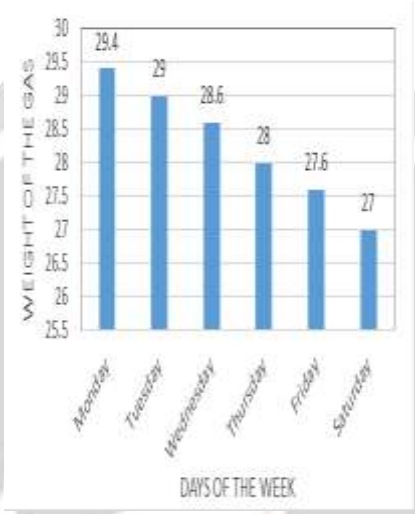

Fig 5: Weekly Analysis of Gas Usage

Fig 6: Dashboard of Android Application

Fig 7: Calendar to see Daily Analysis of Gas

Fig 8: Daily Analysis of Gas Usage

Fig 9: Weekly Analysis of Gas Usage

Fig 10: Monthly Analysis of Gas Usage

Conclusion

This project concludes that the system ensures safe and controlled usage of the LPG gas cylinder. Thus by using this system, daily and weekly statistics of gas consumption will be notified to the user. System does Automatic registration of new gas cylinder after getting confirmation by user. The system provides alerts in case of detection of fire or gas leakage to the user and fire brigade with the location.

Future Scope

To implement " Smart Regulator" this will turn off the Knob of the regulator when the gas is detected by the system.

We are also going to implement the system which will turn off the main power supply when the gas is detected by the system to avoid the gas blast.

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