Automated Gas Booking System using IOT with leak detector

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Abstract: **Gas leakages are a major issue, therefore, the proposed gas leakage detection and Booking system are developed. There are many methods available for a Gas booking. It will be a critical situation for LPG gas domestic users for cooking. The goal of this paper is to initiate a new system automatic book a cylinder when the gas is about to empty is by sending a message to the gas agency using a WI-FI module using the Internet of Things approach. The sensor is used to detect gas leakage at home. If the gas leakage is detected, automatically it will send an SMS to the user. The load cell is used to monitor the weight of the LPG gas continuously. The values are given to the microcontroller using a load cell, gas in the cylinder specifies a value where the remaining percentage level is crossed below the threshold level set for gas getting empty, and then a notification will be delivered to the gas agency automatically to book the new cylinder. Subsequently, a reply notification will be assent to the customer about the booking status. The application software is developed in the gas enterprise to inform and record the booking. This helps out the society to especially detect gas leakage and also helps domestic or industrial consumers who use LPG gas made automatically using the IoT technique.**

Keywords: **LPG, sensor, Arduino, IoT, Home Safety;**

I. INTRODUCTION

Internet of things endeavors toward making life simpler and faster by automating the entire small tasks associated with the life of humans. Today, everything is getting smart due to technology such as IoT. As IoT is very beneficial for automating tasks, the advantage of IoT can also be comprehensive for enhancing the convenient safety methods. Security plays a vital role in households, industries as well as the megalopolis. The use of gases in the environment is unexpectedly not safe at the current time. Everyone needs a system that is time-Saving and reduces efforts and expects their work to be as uncomplicated as possible. Most commonly LPG is used for cooking purposes which were 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 a time-consuming method in people's daily life [1]. However, due to the speedy and high competition, today people look for smarter automated ways of operations of daily manual routine. As such, booking gas has also become one of the tasks where one tends to either postpone or forget or one doesn't get gas is about to empty, or maybe it's booking due to a busy schedule and lack of time. In-home or industries, most of the incidents takes due to gas leakages [10], which leads to several life-threatening incidents. To prevent such a case, the proposed gas leakage detection and monitoring system is developed. MQ-5 sensor is used to detect 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, detecting the gas leakages and alerting the user about the gas leakage sending notification to the user in the other side automatic LPG booking is allowed this is done by using WI-FI or GSM module, as soon as the LPG reaches below the threshold level it will send a notification about the low Gas availability of LPG by getting a notification to user about booking status an LPG Gas by just confirming message through the mobile which is connected to WI-FI[4].

II. MOTIVATION

Highly influenced by the teachings of the Shrimad Bhagavad-Gita we decided to work for the people with speaking disabilities. During academics we had met people with speaking disabilities, we had seen their problems closely. So that was the biggest motivation for us to create this project.

III. PROBLEM DEFINITION

Liquid Petroleum Gas (LPG) is a highly flammable chemical that consists of a mixture of propane and butane. LPG is used for cooking at the home, in restaurants, and for certain users in the industry. They have certain weaknesses that make the gas leakage occur. The leakage of gases only can be detected by humans nearby and if there are no humans nearby, it cannot be detected. But sometimes it cannot be detected by humans that have a low sense of smell. Thus, this system will help to detect the presence of gas leakage.

IV. LITERATURE SURVEY

1. Automation of LPG cylinder booking and leakage monitoring system

Author Abhishek B. N. Bharath, and Gunasheel B have 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 a small amount of gas is brought near the sensor it starts alerting the user about the leakage of the gas.

2. Automatic LPG leakage detection and hazard prevention for home security

Author P.M. Vidya has suggested that the leakage of the gas can be detected by using various gas sensors.

3. Automatic LPG booking, leakage detection, and real-time gas measurement monitoring system

Author N. S. G. B. D. Jolhe has proposed a gas leakage system and monitored the LPG level where the gas leakage is detected automatically.

4. Automatic Power Meter Reading System Using GSM Network

Author H. G. Rodney Tan has suggested that the message or the notification can be displayed by using the LCD for a visual indication of the LPG monitoring

V. PROPOSED SYSTEM

In this proposed system, the gas leakage is detected by an MQ5 LPG gas sensor which is interfaced by Arduino, and automatic booking is designed this device will be a single system with multiple applications for LPG consumers. If the gas leakage is detected by the LPG gas sensor the device gets on with a buzzer alarm and displays an alert message on the LCD, the external coupling is made to turn off the gas regulator and the notification will be sent to the user through mobile by warning calls and SMS. Load cell which is also known as a pressure sensor is used to detect the weight of the gas and the result will be displayed through an LCD. If the weight of the cylinder is below the threshold level automatically the new cylinder will be booked and the delivery information sent to the consumer through the GSM module.

VI. METHODOLOGY AND ALGORITHM

The sensors microcontrollers, relays, LCD, and buzzer which is being motorized by the power supply. This power supply sector is involved to convert from alternating current to direct current and decreasing the amplitude signal.

Mq 5 sensor

It is constructed by micro AL203 ceramic pipe and contains a 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 electronics to be as easy as possible. It uses different microcontrollers, containing several input and output pins [7]. Several methods are available to flash the memory and RAM in the Arduino. It provides an 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 that is used to control all other electronic devices by using the electromagnetic mechanical toggle LCD LCD (liquid crystal display) contains two interfaces on the upper and lower sides of the module. The 16x2 LCD has a height and width size of 80.0 x 36.0 mm and contains a VA size of 66.0 x 16.0 mm and a thickness is 13.2 mm. its operating power supply ranges from +5.0 V or +3.0 V.

Load cell

The load cell is a transducer that is used to transform force into electronic output [6]. 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 networks 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 that is capable of controlling microcontrollers' IO directly, with the working voltage of 5V
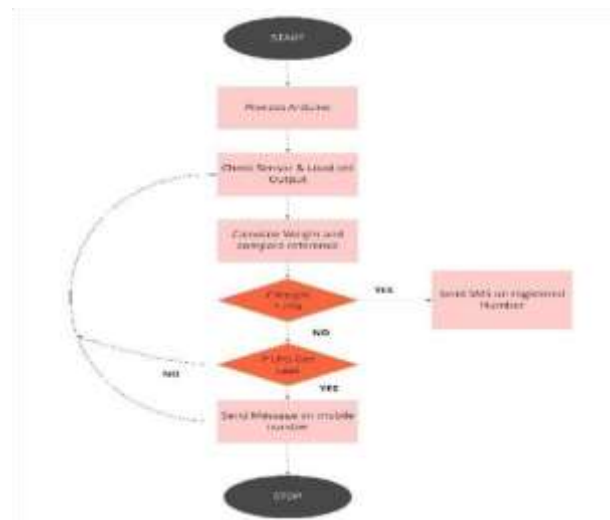
Figure 2. Flow diagram of the activities of the gas leakage detection system

VII. MATHEMATICAL MODEL

Let S be a set of the parameters having S = (I, O, F)
Where, S: System.
I= {GD , GW } are set of Input
Where,
GD: Gas Detected.
ˆ GW: Weight of cylinder
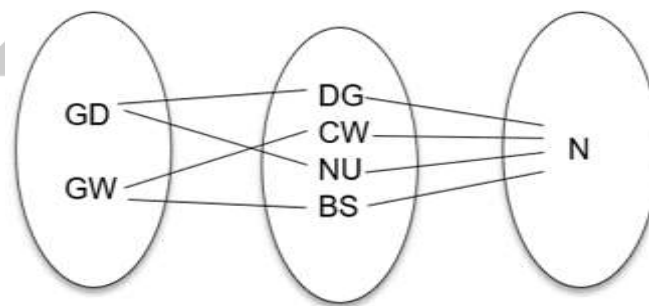F = {DG, CW, NU, BS} are set of Function
Where,
ˆ DG: Detect Gas.
ˆ CW: Calculate Weight.
ˆ N: Notify User.
ˆ BS: Booking Status.
O = {N} are set of Output where,
ˆ N: Notification

VIII. SYSTEM ARCHITECTURE

In this present system, the gas leakage is detected by the MQ5 gas sensor which is interfaced by Arduino [2], when the gas leakage is detected through the MQ 5 sensor the motor turn on and the lights turn off with a buzzer alarm, and displaying an alert message in LCD [11], at the same time the notification will be sent to the user through mobile which is connected via WiFi. forward, the function of this proposed system is as below

- Load cell which is also known as the pressure sensor is used to detect the weight of the gas and the result will be displayed through LCD
- If the weight of the cylinder is below the threshold level, the booking confirmation message will be sent to the user through mobile
- The Cylinder's weight will be calculated using the Load cell.
- WI-FI modem can send and receive messages.
- Message will be sent from system to LPG agency and receive a confirmation notification.
- However, as with other segments of this system, it also detects leakage of gas in LPG models through sensors. LCD is

used to display the alert message i.e "LPG leakage detected" displayed when the leak is detected by the system. Figure 1 depicts the architectural block diagram of the proposed gas leakage detection system.
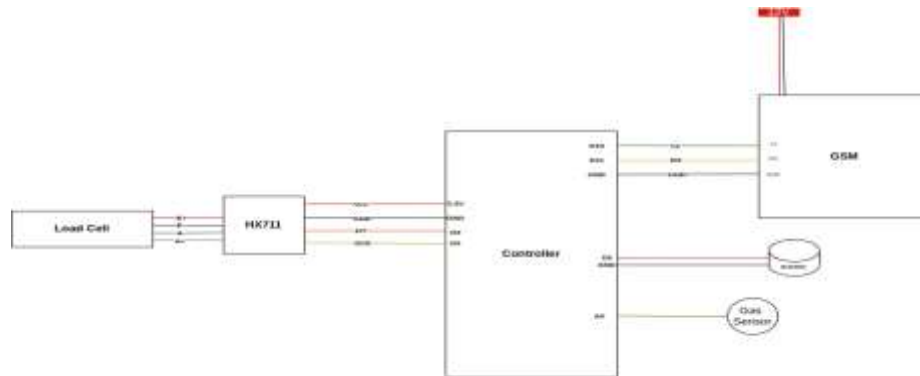

Figure 1: Architecture of gas leakage detection system.

IX. RESULT AND ANALYSIS

The prototype of the projected system is shown in the Figure. This proposed system is developed to detect and monitor the LPG when a small amount of LPG is brought near the MQ5 sensor, it displays 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 are 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 a 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 the gas sensor and the 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 a weight sensor. Thus, the proposed system helps the LPG gas customers to lead pleasant life.

X.   FUTURE SCOPE

Even if this project is working there is a lot of correction required in this project. The accuracy can be increased the time complexity of the project is a little bit high so some work is still required to find the optimal solution. Else, this project could prove a game-changer for society. We can understand the thoughts of deaf and dumb people.

ADVANTAGES

• The main advantage is the automatic booking of LPG cylinders by sending an SMS to the Distributor company and also alerting the user.
• It ensures security from gas leakage and hazards.
• It's very less time-consuming and the cylinder is replaced in time.
• Easy to implement.

APPLICATIONS

• In houses to detect the Gas leak and refill it.

XI.   CONCLUSION

IoT has gained wide popularity in recent decades due to its various streams of applications which have the way for a safe and feasible mode of living style for mankind. One such area of application includes gas booking and gas leakage detection for both domestic and industrial purposes. Though, several techniques is existing for the same, gas leakage detection is one major concern and a challenge as increases in domestic and industrial sectors. This paper thus put forth a new proposed system which is a microcontroller-based application of gas booking and gas detection systems using IoT. The sensor used in this model can detect the leakage of the gas, and the user gets a notification regarding the remaining percentage of gas in the cylinder as well certain procedures can be taken to prebook the new cylinder without any delay or due. This proposed system can be useful in marketing sectors like hotels, shops, etc. The main intention of this work is to ensure a safer and more feasible way of gas booking and gas leakage detection to avoid any incidents that may occur due to negligence.

XII.   ACKNOWLEDGMENT

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