Automatic Gas Reservations Using IoT with Notification

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Abstract: Gas leaks and fires are a common occurrence in our daily life. LPG, or liquefied Petroleum gas is a highly flammable gas used in heating appliances. If this gas escapes, it increases the risk of fire, choking, and explosion in the building. Because LPG use is growing daily, the booking mechanism is ineffective. The system is unable to register and respond to each booking request due to the large number of customers. This project is concerned about the issues and contributes to its effectiveness. If the gas level goes below a predetermined level, a phone warning is sent, and after consumer confirmation, the gas agency is informed to record the booking. By detecting any gas leaks or flames, the effort also ensures the safety of individuals who operate near the cylinder. If any of these are detected, a buzzer will beep. This will be informed to the user as well as the gas agency.

Keywords: Internet-of-Things (IoT), Fire sensor, Gas sensor, Load cell, GSM module, LCD module, Weight sensor.

1. Introduction

Gas cylinder at home may run out at any time. In the event that you don't have a spare cylinder at home, this could be very problematic. It would take many days to reserve a cylinder at that time and to get a confirmation from the gas company. As a result, it's crucial to keep an eye on the cylinder's LPG level and be alerted if it drops below a certain point. As a result, efforts are working together towards goal. This project also gives the gas agency immediate booking notifications with the client ID. As a result, a new booking will be made automatically prior to the expiration of the old LPG cylinder.

An IoT-based initiative for automatic booking notification and gas level detection was presented to save people's time and lives. LPG is a byproduct of the petroleum industry. LPG is used in a wide range of applications. Due to a lack of LPG production in India, providing LPG through pipes is not feasible, as it is in other industries such as cooking and welding. LPG usage is steadily increasing. Booking an LPG cylinder is a tricky business these days. When we phone a gas agency, it's possible that the call won't be answered or that the reservation won't be recorded.

Gas is extremely important in everyday life. People commonly forget to reserve a gas cylinder due to their hectic schedules.

They will benefit much from this endeavour. Furthermore, if the user does not detect gas leakage in a timely manner, he or she will be forced to inhale a large volume of gas, resulting in health concerns and, If the user is in a closed room, the worst-case situation is death. Furthermore, if gas is released in an area where combustible materials or tiny sparks are present, the risk of fire is very high. This paper is a useful and good means of keeping track of the gas level in the container, as well as alerting and putting a refill order with the appropriate gas agency using IOT module.

2. Literature Survey

[1] The suggested system has been successfully designed and implemented. In today's fast-paced technologies, Spending time on manual booking is impractical when tasks can be completed with technology. As a result, booking gas using IOT is basic and uncomplicated. In this research, they are using a number of sensors. Each sensor will carry out its duty in a distinct manner, making it easy to spot and enhance performance. To measure the pressure in the cylinder pipe and the volume of gas in the cylinder, a pressure sensor can be used in place of a load cell. When the concentration reaches a specified level, the user is notified and instructed to take the appropriate steps. The hardware of the device is connected to Ubidots, and the connected data is transmitted to it.

[2] Gas leaks are a major issue in homes, which is why this proposed gas leakage detection and monitoring system was developed. The primary goal of the article is to present a new system that automatically schedules a cylinder when it is ready to run out of gas by notifying the gas company over WiFi using an Internet of Things technology. The secondary objective is to determine the weight of the remaining gas in the cylinder, which can be accomplished with the use of a weight sensor. As a result, the proposed approach will assist LPG gas consumers in achieving a safe atmosphere. Because the Internet of Things is so effective at automating jobs, it might also be utilised to improve practical safety procedures. Dr. Walter Snelling was the first to introduce LPG, and it is most commonly used for cooking. Gas leaks, which cause innumerable accidents and even human deaths, are the most common causes of disasters in the home or in industry. In order to address this issue, the proposed gas leakage detection and monitoring system was developed and is discussed in this paper.

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[3] Technology has advanced to the point that any task can now be accomplished swiftly and without difficulty. The goal of this Internet of Things project is to automate the booking of gas. Many residential accidents occur as a result of people being unaware of a gas leak. This endeavour also aims to limit the amount of LPG gas leak-related accidents. The concentration of LPG gas rises when there is a leak, which is seen on ubidots.

As a result, a user alert message is issued and a signal is used to communicate this. No GSM or Bluetooth modules are needed for this system to transmit messages. It generates a warning and sends a message to the user when there is a gas leak, in addition to cutting off the main power source. The microcontroller is connected to all of the devices. The amount of gas inside the cylinder is continuously displayed on the LCD display. The user gets alerted to a gas leak even if his phone is not connected to the internet; all that is needed is for the Node MCU, to which all sensors are linked, to receive wifi. This system is simple to set up and use.

[4] There are three key difficulties that the suggested topic "IoT (Internet of Things) based Smart Gas Management System" addresses: gas leakage detection, fire detection, and automatic booking of gas cylinders. To identify gas leaks, fires, and to continuously check the amount of gas in the cylinder, this system uses a load cell, a gas sensor, and fire and smoke sensors. In this project, a microcontroller called the Arduino UNO is being used. It has every type of input and output device, including buzzer, LCD display, load cell, fire sensor, and gas, fire, and sensor of combustion. When inserted into a GSM Module, a SIM card can make phone calls and send SMS messages using AT codes. Voice-based alarm messages are recorded using the Voice Module. When a crisis occurs, a call is placed to the registered mobile phone number, and as soon as the call is answered, the recorded speech is played again. The outcomes of each module can be seen on an LCD screen. In the event that a gas leak or wastage is discovered, the buzzer begins to beep. Implementing an IOT-based Smart Gas Management System can therefore reduce the harm caused by gas leaks.

3. Implementation

The hardware and software components which are used in the projects are given below:

Hardware used: NodeMCU, MQ-5 sensor, DHT22, Flame sensor, Alarm buzzer, I2C OLED display, load cell.

Software used: Arduino IDE, Visual Studio Code, Firebase.

Methodology:

In the proposed system, A load cell periodically measures the weight of LPG in the cylinder and transmits the results to NodeMCU. When a new input is acquired, the microcontroller analyses it and, by substituting input, verifies the conditions stated in the code. Additionally, the weight will be shown on the LED screen. The microcontroller will activate the WiFi module and send a message to the user and the gas agency ordering them to book LPG using the supplied customer ID if the weight of the LPG is less than the threshold. LPG leaks will be detected via a gas sensor. The input signal will be supplied to the microcontroller if any leakage is detected. The microcontroller then activates the WiFi module, which sends a

gas leaking message to the user's mobile phone while also activating the alarm buzzer. Similarly, if a fire is detected near the cylinder, the temperature sensor will send an input signal to the microcontroller, which will activate the WiFi module and send the fire detection message to the user's mobile phone, as well as activate the alarm buzzer.

4. Results

Fig. 1. The outlook of the project

This is the overview of the project. The picture highlights the components like LED display, fire sensor, temperature sensor, gas sensor and a relay which is shown in Fig. 1.

Fig. 2. LED display

Fig. 2 displays the Temperature and humidity of the surroundings for every one minute.
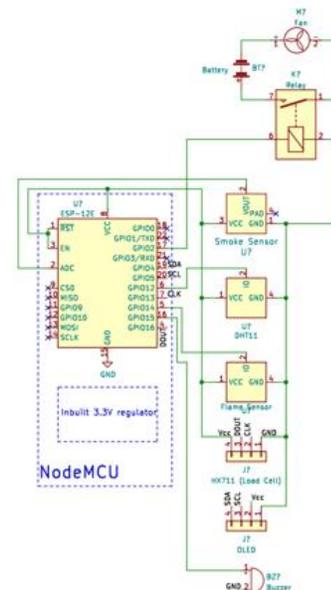

Fig. 3. The circuit diagram of the project

The Fig. 3 depicts the circuit diagram of the project and the component connections that are made using the sensor.

Fig. 4. Gas alert on display

The Fig. 4 shows the LED display that is informing about the fire which is detected in the surroundings. It alerts the user whenever the fire is detected.
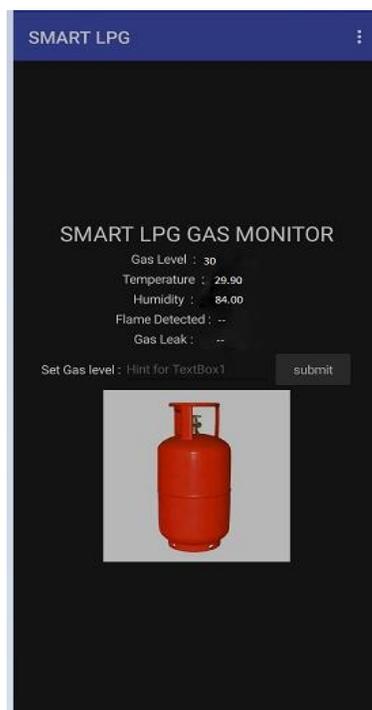

Fig. 5. Mobile application

Notifications are sent to user through app about the percentage of the gas level, temperature, humidity and it also informs about fire if any fire is detected in the surroundings which is represented in Fig. 5.

5. Conclusion

People will save time by having automatic gas reservations if the technology is implemented. It can provide protection to people by detecting gas leaks. It can be used both in the home and in the workplace. The project is user-friendly due to the ease of use of this technology. Detecting gas leaks and fires could be added to the suggested system. To regulate and keep track of the LPG cylinder's weight, a mobile application can be developed. In the event of a fire, a water mist system can be installed, and the proposed method can also send a GPS warning of the fire accident's location to the fire station.

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