IoT Based LPG Leakage Detection

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ABSTRACT

Gas leakages result 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 is 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 also helps both customers and the agency to get the gas booking made automatically using the IOT technique.

Keywords: LPG sensor, IOT, Home Safety, cloud computing, ESP32.

I. INTRODUCTION

The Proposed system manages to detect LPG gas leakage and send notification to the user. The additional features are smoke and fire detection, automatic LPG booking by measure the weight of cylinder using load cell and internet of things. 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 is 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.

II. LITERATURE REVIEW

LPG gas is a mixture of hydrocarbon gases like propane or butane. It comes from the natural gas processing and petroleum refining. LPG is liquefied under moderate pressure and has replaced many conventional fuel systems in household and commercial sectors. It is the mostly used fuels in household, commercial. Industrial appliances, it has an explosive range of 1.8–9.5Percent volume of gas in air. The Household category of LPG cylinder contains 14.2 kg LPG in the cylinder. Similarly, the Commercial and Industrial categories of LPG cylinders contain 19 and 35 kg of LPG respectively. The LPG is filled only up to 85 Percent in these cylinders above which will be vapors. This is due to the expansion property of the LPG and consequently, contributes as a safety precaution to avoid any hazards. For every 1 rise in temperature, the pressure of LPG inside the cylinder will increase by 15 kg/cm3. Which makes the LP gas cylinder more dangerous and extremely inflammable gas.

With the increasing demand of LP gas users, most of the time user must face many dangerous accidents occurs by gas leakage due to inappropriate and unavailable of timely action. In such a situation an efficient method to establish a safety system as well as monitor the level of LPG in the cylinder is required, so that the users are aware of the LPG level within the cylinder. They can take the initiative to stop the leakage and can take necessary steps to in booking a

new cylinder. In this era, where everything is powered by electricity, a small spark in the premises during LPG leakage is more than enough to cause an explosion. So, it is highly necessary that the users are aware of the necessary precautions to be taken during an LPG leakage [1], [2].

A large amount of research has been going based on LPG gas leakage detection and protection system. In the era of technology development brings an efficient and effective technology. Johnson-Williams Instruments founded the first gas detection technology in the year 1928 by developing a company. The owners of J-W instruments were Dr. Oliver Johnston and Phil Williams. J-W Instruments the first electronics company for gas detection in Silicon Valley. More than 40 year they were successful as, the company made a huge impact in gas detections. They were successful to make the instruments more portable and user friendly and were able to make first combination instrument that could detect both combustible gases/vapors as well as oxygen. In the 1980s and 1990s, before the development of electronic household, by detectors of carbon monoxide presence of carbon monoxide was detected with a chemically infused paper that turned brown when exposed to the gas [3]. Since then, many electronic technologies and devices have been developed to detect, monitor, and alert the leak of a wide array of gases under instantaneously. The above research and talks with eminent engineers from various industries laid the foundation for gathering information about the proposed system.

The proposed system is an effective combination of dual features which are manufactured in a cost-effective way. The paper discusses all requirements and methods of implementation for the proposed system. Introduction is followed by brief description of the components and their working principle in Section II. In the following sections, the system operation and experimental results are described. Necessary figures are included for further clarity with a closing note on how the system can be improved in the future.

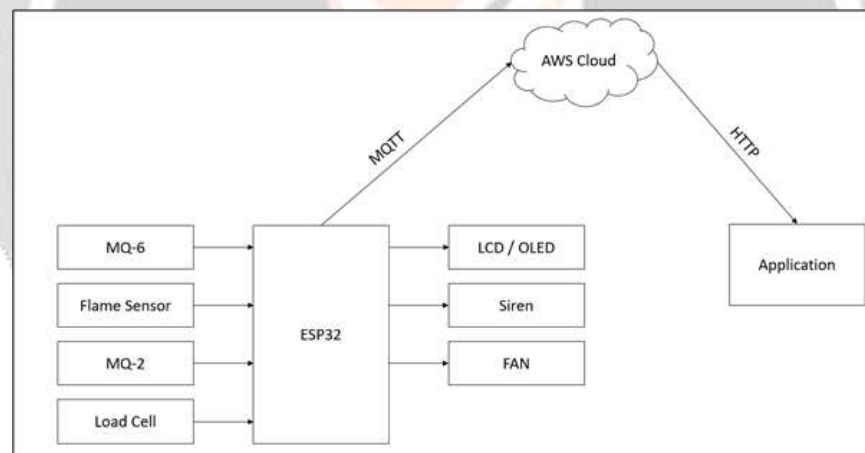### III. PROPOSED ARCHITECTURE

Figure 1 System Architecture

Each one of the above mentioned three phases of implementation of Smart Freight Box is explained in detail below -

In this proposed system, the gas leakage is detected by MQ-6 sensor, which is interfaced with ESP32, when the gas leakage is detected through the MQ-6 sensor the Fan gets on and lights gets off with buzzer alarm and displaying alert message in LCD display, 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 weight 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.
- The threshold range will be embedded and usually developed using Programming.

- 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 controller and automatically shut down 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.

IV. 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 system thus put forth a new proposed system which is micro-controller-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 safe and easier way of gas booking and gas leakage detection to avoid disasters that may occur due to negligence.

V. REFERENCES

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