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DEVELOPMENT OF A LPG MONITORING AND AUTOMATIC CYLINDER BOOKING WIRELESS SENSOR NETWORK

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ABSTRACT

LPG is commonly used for cooking in many countries due to its enconomic benefits and convenience. This paper explores an IoT application designed to measure and display the gas content in houshold LPG cylinders, facititating automatic booking of new cyliders and detecting gas leaks.Typically , the capacity of LPG in a cylinder is not easily monitored; our system addresses this by displaying the current LPG level using a load sensor (SEN-10245). The sensor output is connected to an Arduino R3, which processes the data.Using a GSM module, the system sends SMS notifications to users regarding the LPG level and automatically dials a registered gas booking number when a new cylinder is needed. Additionally , a gas sensor(MQ-6)is employed to detect leaks, enhancing safety by preventing potential gas explosins. The current LPG level is continously displayed on an LCD, and users can track the validity of the LPG users via mobile message when the LPG level falls critically low (below 20%), ensuring timely action This automated system prevents both premature and diaplayed booings and significantly reduces the risk of gas- related accients at home

I.INTRODUCTION

In our day to day life, LPG cylinder plays a major role. The main application of the LPG is that it is used in the place of chlorofluro carbon which causes great damage to the ozone layer. Despite being one of the most commonly used fuels,LPG has an explosive range of 1.8% to 9.5% by volume in the air.It is categorized into three classes based on the weight of the LPG in the cylinder : domenstic, commercial, and industrial.The domestical class of LPG cylinders typically contrains 14.2 kilograms of gas, making it suitable for household cooking and heating

needs.

Similarly, the business and Industrial classes of LPG cylinders contain nineteen and thirty five kilo of LPG severally. With the rising demand for LPG, users have to be compelled to pre book their LPG cylinder a minimum of a month before the delivery of the new LPG cylinder. Most of the days, users find it difficult to figure out what quantity of LPG is left at intervals the cylinder and this causes tons of bother to them. In such a state of affairs, associate degree efficient technique to watch the amount of LPG within the cylinder is needed, so the users are tuned in to the LPG level at intervals the cylinder. This paper deals with the detection of the gas leakage and the level of gas in the cylinder and automatic booking of the new LPG cylinder. The sensor used in this has the high sensitivity and fast response time. The gas sensor detects other gases including cigarette smoke. When the gas is detected the output of the sensor is send to the microcontroller and the buzzer is turned on and when the weight measured using load sensor becomes critically low, the alert is send to the user and the new LPG cylinder is booked. The main application of this proposed system is to overcome the shortcomings such as delay and pre-booking of the LPG cylinder by the consumers.

II.LITERATURE SURVEY

S., Koushanfar, F., Kosterev, A., Tittel, F., "LaserSPECks: Laser SPECtroscopic Trace-Gas Sensor Networks - Sensor Integration and Applications", Information Processing in Sensor Networks, 2007. IPSN 2007. 6th International Symposium on, April 2007, p. 226 - 235, ISBN 978-1-59593-638-7

We report wavelength modulated TDLAS/QEPAS trace gas sensors with reduced size, efficiency, and cost for use in environmental sensor networks and medical exposure monitors. CO2 measurements with a 2μm diode laser dissipate Infrared laser absorption spectroscopy is an established technique for trace-gas sensing, but laser based chemical sensors typically require >100W of power, are implemented in a tabletop form factor and typically cost ~$35,000 USD,. Any one of these factors precludes these sensors to be used as dense, large area, distributed environmental trace-gas sensor networks [1], wearable industrial gas or carcinogen exposure monitors and portable medical biomarker breath analyzers [2], In order to achieve low

cost, high efficiency, and an ultra compact footprint, we optimized the sensor characteristics and control for a miniaturized sensor platform. Due to the similarity of the control, signal measurement, and data analysis required for Tunable Diode Laser Absorption Spectroscopy (TDLAS) [3], Photoacoustic Spectroscopy (PAS) [4], and Quartz-Enhanced Photoacoustic Spectroscopy (QEPAS) [5], a single platform can be implemented for a sensor which can be based on these sensor architectures. A complete trace gas sensor consists of a laser source, absorbance detection unit (optical multipass cell and detector, photoacoustic cell and microphone, quartz tuning fork), dedicated control and data acquisition electronics, and an energy source (e.g. batteries).

P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automatic lpg leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014.

LPG is widely used for cooking in many countries for economic reasons, for convenience or because it is the preferred fuel source. This paper focuses on the application of the IoT which is used for measuring and displaying the gasoline content present in household LPG cylinder and this is helpful in automatic booking of new LPG cylinder and also detect the gas leakage and start the alarm. Usually the capacity of LPG in Cylinder is not determined, so we are going to display the level of LPG. The level of LPG is measured using load sensor. The output of the sensor is connected with Microcontroller (Atmega8).By use of GSM Module, the information is sent to user by SMS (short messaging service) and also automatic booking is done, when the cylinder gets empty. If no need of the cylinder, then cancel the booking cylinder. Then the gas leakage is detected by gas sensor (MQ-2), then cuts the power supply automatically. By using this, we can detect the current LPG level and it is continuously displayed on the LCD. We can know the validity of LPG usage from the date of initialization. By use of IOT the user is alerted by giving the message to their mobile phone when the LPG level is critically low(below 20%).Automatic booking of new LPG by when the cylinder gets empty then automatically transfer message to the LPG agency for booking cylinder.Then by detecting the

gas leakage then information is send the user and fire station. In our day to day life, LPG cylinder plays a major role. The main application of the LPG is that it is used in the place of chloroflurocarbon which cause great damage to the ozone layer. Though it's one in all the foremost normally used fuels, it is associate explosive vary of one.8%–9.5% volume of gas in air. It is packed into three classes per the burden of the LPG within the cylinder: social unit, business and Industrial. The social unit class of LPG cylinder contains 14.2 kilo LPG within the cylinder. Similarly, The business and Industrial classes of LPG cylinders contain 19 and 35 kilo of LPG severally. With the rising demand for LPG, users have to be compelled to pre book their LPG cylinder a minimum of a month before the delivery of the new LPG cylinder. Most of the days, users find it difficult to figure out what quantity of LPG is left at intervals the cylinder and this causes tons of botherto them. In such a state of affairs, associate degree efficient technique to watch the amount of LPG within the cylinder is needed, so the users are tuned into the LPG level at intervals the cylinder. This paper deals with the detection of the gas leakage and cut the power supply automatically,then immediately send the message to the user and firestation . The level of gas in the cylinder and when the gas gets empty transmit message to the lpg agency for automatic booking cylinder and booking information is send to the user.Based on the concept automation of gas booking is done and it has an option of delete button to cancel the booking. The sensor used in this has the high sensitivity and fast response time. The gas sensor detects other gases including cigarette smoke. When the gas is detected the output of the sensor is send to the microcontroller and the buzzer is turned on and when the weight measured using load sensor becomes critically low, the alert is send to the user and the new LPG cylinder is automatic booked. The main application of this proposed system is to overcome the shortcomings such as delay and automatic-booking of the LPG cylinder b y the consumers.and if leakage occur cuts the power supply automatically.

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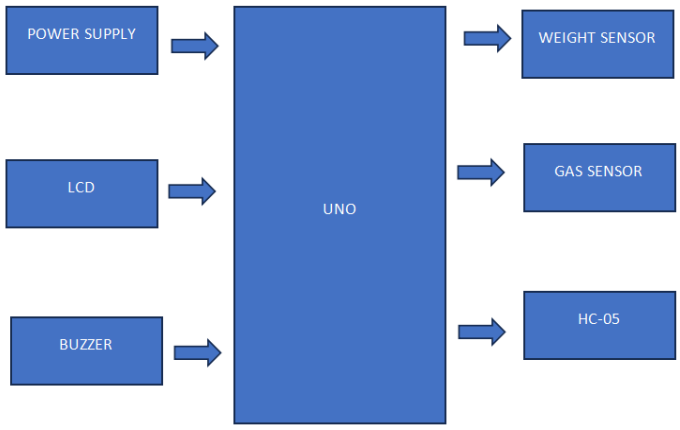
Block diagram



III.PROPOSED SYSTEM

The **LPG Monitoring and Automatic Cylinder Booking System** aims to streamline the management of LPG gas usage and supply by using a wireless sensor network for real-time monitoring and automated booking of new cylinders. The system integrates Internet of Things (IoT) technology, sensors, and wireless communication to provide users with a smart, efficient, and safe method of managing their LPG needs while ensuring timely refilling and preventing accidents.

1. LPG Level Monitoring:

The system is equipped with sensors installed on the LPG cylinder to continuously monitor the gas level. These sensors, typically weight-based or pressure-based, measure the amount of LPG remaining in the cylinder. The real-time data is transmitted to a central unit (such as a mobile app or a cloud platform) through a wireless sensor network, allowing users to easily check the current status of their LPG supply from their smartphones.

2. Automatic Cylinder Booking:

When the LPG level falls below a predefined threshold, the system

automatically triggers a booking request to the nearest gas distributor. The system is programmed to interface with the distributor's booking system via an application programming interface (API) or through SMS/Internet-based communication. The user receives a confirmation message regarding the successful booking of a new cylinder, and the delivery is scheduled without the need for manual intervention.

3. Wireless Communication:

The system utilizes wireless communication technologies such as Wi-Fi, Zigbee, or GSM/GPRS to transmit data between the LPG sensors and the central control system. This ensures seamless monitoring even when users are not at home, allowing them to stay informed about their LPG supply remotely. The wireless network also facilitates communication with the gas distributor for automatic booking.

4. Safety Monitoring and Alerts:

In addition to monitoring gas levels, the system is equipped with sensors to detect gas leaks. If a leak is detected, the system triggers an alert through an audible alarm and sends notifications to the user's smartphone. In some advanced configurations, the system can also shut off the gas supply valve automatically to prevent accidents. Emergency notifications can be sent to nearby fire departments or emergency services for immediate action.

5. User Interface and Mobile App:

The user interacts with the system through a mobile application or web interface that displays real-time data on gas levels, the status of the current cylinder, and previous booking history. The app allows users to manually book a cylinder if desired and provides alerts for safety-related issues such as gas leaks or sensor malfunctions. It also notifies the user when a new cylinder is on its way or if there are any delays in delivery.

6. Power Efficiency and Durability:

The system is designed to be power-efficient, utilizing low-energy wireless communication protocols like Zigbee or LoRa for longer battery life. The sensors and communication modules are designed to withstand the typical environmental conditions in a kitchen or gas storage area, ensuring reliable long-term operation. The entire system is built with durability in mind, reducing the need for frequent maintenance or sensor replacement.

7. Cloud Integration and Data Analytics:

The system can be integrated with a cloud platform to store historical data about gas usage patterns, which can be analyzed to predict future consumption trends. This enables more efficient management of gas supply for both users and distributors. Additionally, the cloud integration allows for system updates and remote troubleshooting in case of any issues with the sensors or communication modules.

8. Scalability for Commercial and Industrial Use:

While initially designed for household use, the system can be scaled for commercial kitchens, restaurants, or industrial facilities that use multiple LPG cylinders. The network of sensors can be expanded to monitor multiple cylinders at once, and the booking system can be adjusted to handle bulk orders, making it suitable for larger operations that require a continuous supply of LPG.

The **LPG Monitoring and Automatic Cylinder Booking Wireless Sensor Network** enhances the convenience and safety of LPG usage by providing real-time monitoring, automatic booking, and safety alerts, all while reducing manual efforts for users. The system not only ensures a continuous supply of gas but also minimizes the risk of accidents, offering an efficient solution for modern households and businesses.

IV.CONCLUSION

This paper is divided into two sections: the transmitter section and the receiver section, focusing on the automated booking of new LPG cylindes.utilizing a gas snesor and a load cell, the system can moniter both the

gas level and detect anyleaks.Through the application of IoT , users can easily book a new LPG cylinder when needed.This system keeps users informed about their gas levels, preventing both premature and delayed bookings.Additionally, the systems, making this concept suitable for widespread application in various industries based on their specific requirments.

V.REFERENCE

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