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"Survey on LPG Gas Monitoring System using IoT"

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Abstract - In modern days, technology has developed a lot, making the lives of human beings easier. Every household, hotel, industry, and almost everything needs LPG for various purposes. But even a small amount of leakage of the LPG gas can cause huge disasters. Hence, we have proposed an LPG gas monitoring and automatic gas booking system, for safety and security in and around our surroundings. In recent times, people are so busy that they don't have time to check the status of LPG gas. Here, it not only detects the leakage of LPG but also the weight of LPG and sends the message to the user. MQ6 sensor is used for detecting leakage since it is highly sensitive to LPG and can detect even a small amount of leakage and has high accuracy. The advantage is that the weight of the LPG present in the cylinder is monitored continuously using a weight sensor and workload is decreased for the gas agency.

Index Terms: IOT, MQ6, Gas Sensor, LPG Gas Leakage, NodeMCU.

INTRODUCTION

For a user-friendly interface, IOT is been used worldwide and also to establish the Smart Cities. Developing countries, like India, are trying to improve technologies to the lifestyle of the people. But, implementing these high-cost technologies restricts the dream of Smart Cities.The IoT-based LPG gas leaking and automatic gas booking system is introduced to save the time and lives of the people. While refining Crude Oil, LPG is released. The main constituents of the LPG are Propane and Butane. LPG is mainly used in houses, hotels, industries, etc. This mainly happens in India because the use of Petrol is banned by the Indian Government. As a result, Citizens started using LPG cylinders and the rate of LPG is increased in cities as well as villages.

Some people don't know the proper usage methods and precautions to be taken while using LPG cylinders. The leakages happening due to some internal fault can cause huge blasts and accidents, resulting in injuries and loss of lives affecting a large array of people. To avoid such mishaps, we have introduced this LPG gas monitoring system to keep a track of leakage and the weight of the cylinder.

In today's busy schedule, people often forget things. Sudden emptying of LPG cylinders may disturb people's daily routines. It is also difficult to try getting it from the gas agency at the last minute and may require paying extra money. To solve this issue, we have a system that allows alerting the user when the weight of gas goes below the certain pre-set threshold value and allows automatic booking of cylinders ahead of time to convenience the lives of people.

LITERATURE SURVEY

Sl. No.	Topic	Author/Year	Inference
1	LPG Leakage Detection and Smart Gas Booking System	Purva Duggal, Akshay Pawar, Poorva Kalkatte, Prof. Rushikesh Bhalerao (2020)	Usage of MQ-2 gas sensor to detect the LPG leakage. Continuous monitoring of the level of LPG present in the cylinder.
2	LPG/CNG Gas Leakage Detection System with GSM Module	Alan M John, Bhavesh Purbia (2020)	The system detects the leakage of LPG using a gas sensor and uses GSM to alert the user via SMS to the programmed number.
3	GSM-based Gas Leakage Detection and Ventilation System using Arduino and Servo Motor	Atkia Samiha, Farhad Hossain Sarker (2020)	This system includes GSM, makes user or the owner of places observant by sending a text message on their phones, and also maximize the range of people notified through a buzzer and an LCD employed .
4	Automated Unified System for LPG using Load Sensor	Gokula kaveeya S, Gomathi S, Kavipriya K, Kalai selvi A, Sivakumar S (2020)	The leakage is sensed through the MQ5 sensor and the load cell measures the gas threshold level and booking are automatically done when the threshold drops to 20%.

5	Gas Leakage Detection and Smart Alerting and Prediction Using IoT	Asmita Varma, Prabhakar S, Kayalvizhi Jayavel (2020)	The IoT is used to alert the concerned user via call, SMS, and e-mail, and also predict hazardous situations by performing data analytics.
6	LPG leakage detection using IoT	Prof. Dr Chetana Tukkoji Prof. Sanjeev Kumar A N	LPG leakage is classified into three categories, LOW, MEDIUM & HIGH based on the square measure. This paper conjointly shows the ratio and temperature.
7	Gas Leakage and Fire detection using Raspberry Pi	Sourabh Jamadagni, Nikita Chougule, Priyanka Sankpal, Shwetali Patil, Nikita Chougule, Shailesh Gurav (2019)	This paper presents industrial monitoring system using IOT, the sensor used here is MQ2 for leakage detection. Raspberry Pi ensures all components are interfaced
8	GSM-based Low-cost gas leakage explosion and fire alert system with advanced security	Pritam Ghosh, Palash Kanti (2019)	It is equipped with a GSM modem as wireless media to send information to the owner through SMS and preventive measure is taken in absence of people.
9	Augmented Approach for Gas Leakage Detection using Swarm Robotics	Niladri Sarma, Arpit Mittal, Deeksha Choudhary, Aishwarya Chowdhury, T.Ramya (2019)	This paper aims at developing a swarm robot structure that is capable of interacting with one another through communication and the alert message is shared with the user through GSM.
10	Microcontroller-based gas leakage detection and evacuation system	Aderibigbe, Adekitan, Victor, Matthews (2018)	The microcontroller-based system activates a buzzer when gas leakage is detected and shuts the gas supply, hence sending the text via SMS to the stored mobile number.
11	Embedded Based LPG Das Monitoring & Automatic Cylinder Booking with Alert System	Prof. Mangesh Kakden, Kalyani janbande, Pradnya Gothe, Payal Ninave, Sancheti Dhoke (2018)	The proposed model notifies alert people before any leakage from the gas cylinder and the gas level reaches below the threshold limit of gas around 2kg so that the user can replace the old cylinder with the new one in time and automatically book the cylinder using a GSM module.
12	Android Application-based Gas Leakage Notifier	Aishwarya R, Akshath R Hegde, Ashwini N, Mohammed Thavaf A R, Anitha C (2017)	This paper introduces such a method, wherein the client is kept mindful of the leakage status through an Android application and cellular network-based SMS. The proposed solution is highly flexible and cost-effective.
13	Gas Level Detection And Automatic Booking Notification Using Iot	K.Muthamil Sudar, D.Lakshmi Lokesh, V. Samara simhareddy, Y. Chanikya Chowdary, C H. Harish Kumar, Nagaraj. P, P. Chinnasamy (2017)	As this project monitor's the gas level in the cylinder and if the gas level is lesser than a certain level then it automatically sends a notification to both user and the gas agency using a mobile network (GSM).

OBJECTIVES

- Real-time gas monitoring system.
- Automatic gas booking system.
- LPG gas leakage is detected and an alert message will be sent to the user.
- The buzzer will be triggered at the time of leakage.
- The level of gas will be measured and sent a message to the user.
- It offers safety and security for houses, hotels, industries, etc

PROPOSED SYSTEM

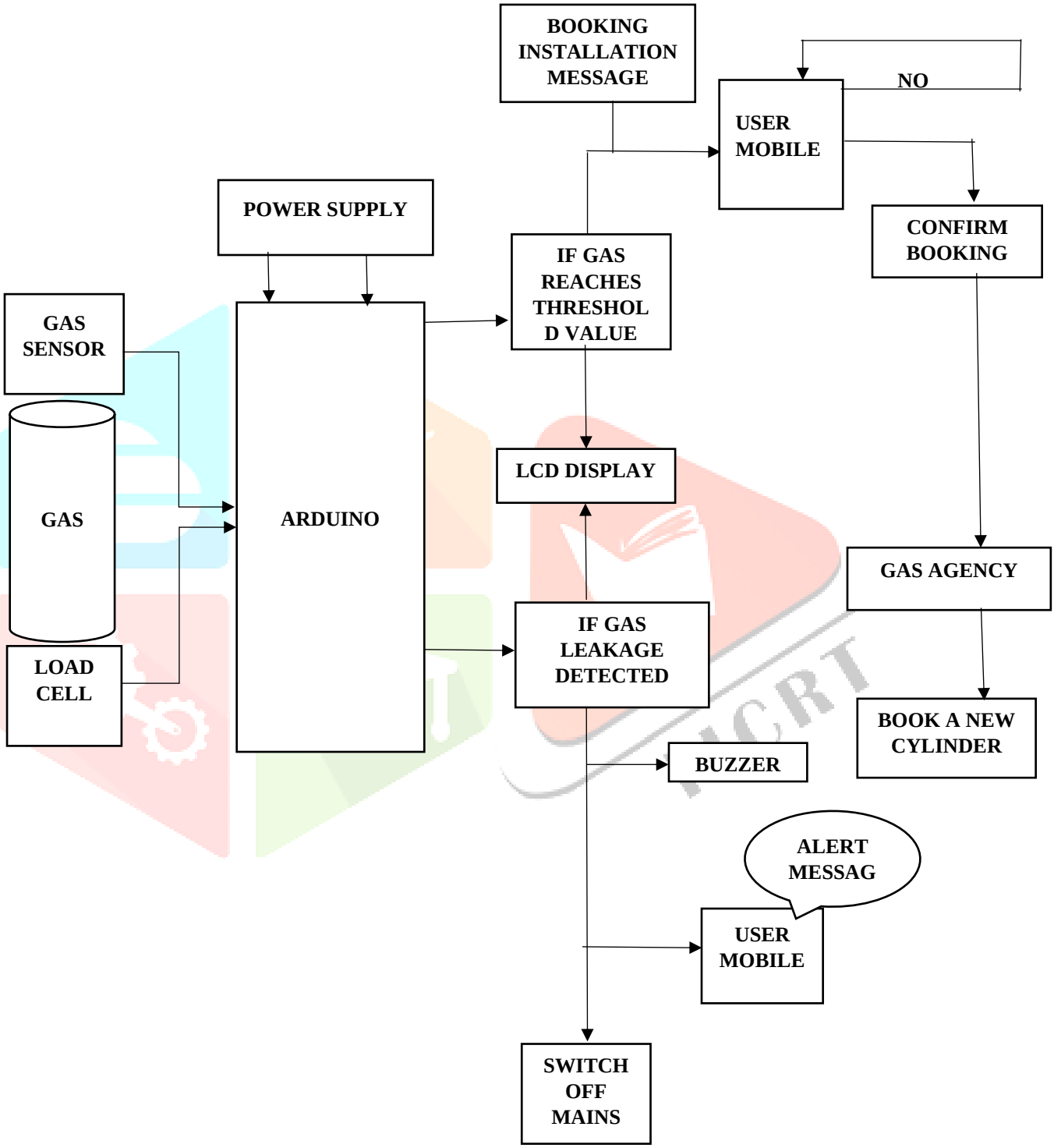
The purpose of this system is to ensure the safety and security of people. The main aim is to ease the life of people and help them make efficient use of their time. Here, gas sensor is used to sense the leakage as it is highly sensitive to the smallest amount of LPG being leaked. We are using an Arduino microcontroller coded with Embedded C language. Wifi module is responsible for transmitting messages and sending alerts to the user in case of Leakage. It is also connected to the weight sensor to constantly keep a check on the amount of gas left in the cylinder and send an alert to the user when the gas level reaches below the threshold level. The user is sent an option to confirm the automatic gas booking along with the threshold level alert.

COMPONENTS USED

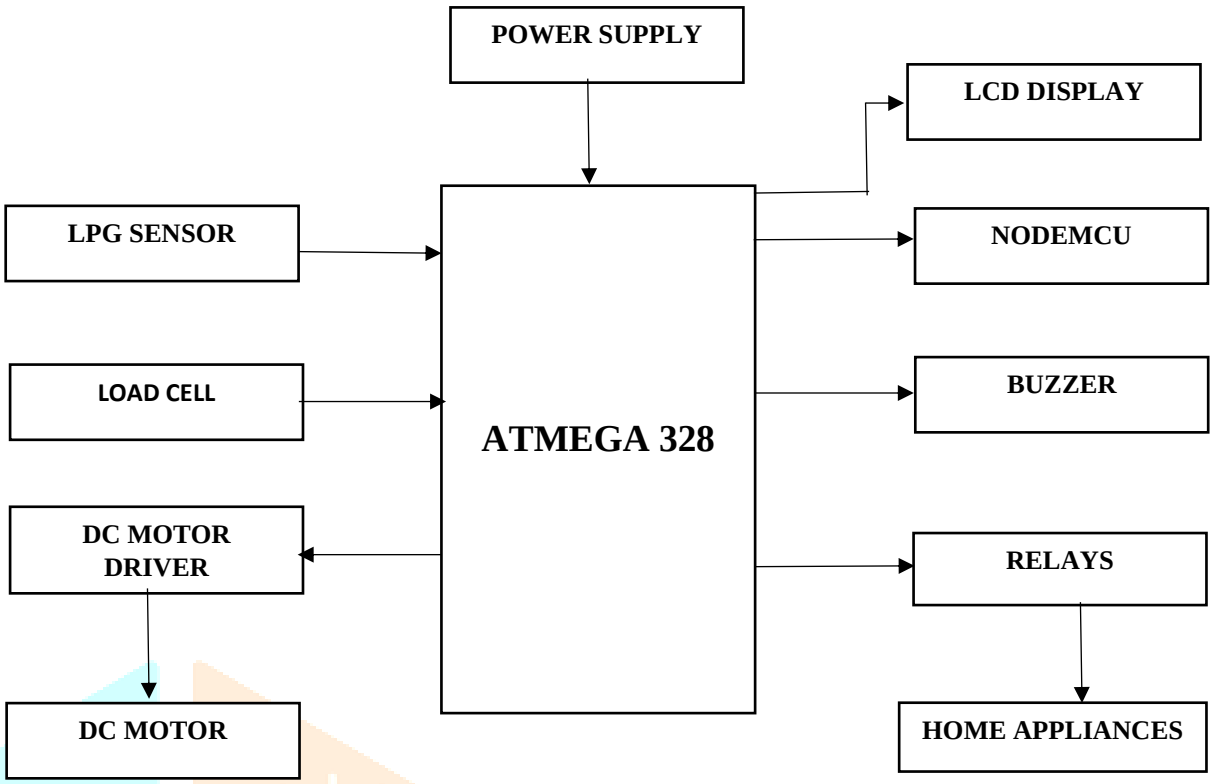
- MQ6 Sensor: MQ6 Sensor is responsible for detecting LPG concentrations of 200-10,000 ppm LPG. It is highly sensitive to LPG, Isobutane, and Propane.
- NodeMCU: NodeMCU is an open-source firmware for which open-source prototyping board designs are available. It uses module ESP8266.
- Arduino: Arduino is a microcontroller board that works based on ATMega 328P. It is a low-cost microcontroller that is easy to use and programmable, open-source, and flexible.
- Buzzer: Buzzer indicates the LPG gas leaked. The buzzer is used to produce a sound to alert the user.

SYSTEM ARCHITECTURE AND METHODOLOGY

In LPG gas, detection of leakage is done by the gas sensor which is interfaced with Arduino. When gas is detected, we inform the user about the gas leakage by sending the message, turning on the buzzer, and also the message displayed on the LCD. In auto gas booking we continuously measure the amount of gas which is present in the cylinder. When the gas level goes below the set level then the message will be sent to the gas agency through NodeMCU Module and a confirmation message received by the user from the gas agency. So, the user gets the cylinder within time. Whenever gas leakage is detected by the LPG sensor automatically relay connected to the mains will be disconnected in turn there will be no supply to the home. In turn, avoiding any fire hazards. Simultaneously windows will open to make sure gas intensity reduces. The below diagram represents the architecture of the system.



SYSTEM ARCHITECTURE



BLOCK DIAGRAM OF MICROCONTROLLER CONNECTION

CONCLUSION

Implementation of this project can help people save time by providing automatic gas bookings. It can provide safety and security to people by sensing the leakage of gas. It is found to be useful for domestic as well as the industrial purposes. The programming used is basic and simple and hence can be easily understood as we have used C language. The project is extremely user-friendly and very easy to use.

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