IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10539

Monitoring and Prevention of Gas Leakage at Homes

Syed Ghouse

Computer Science Engineering, Hipoint College of Engineering and Technology, Hyderabad, India

Abstract: Hundreds of billions of people have used LPG cylinders to cook since they were first discovered. These potentially dangerous gas canisters have been carefully encased. As a result of several sad accidents, their basic safety measures have been strengthened. Unwanted circumstances have been efficiently avoided using tools such as mechanical flow controls, fire blocks, and smart valves. This thesis proposes another viable alternative that might be extremely beneficial to the cause. During operation, the project combines safety and gas availability. The amount of gas within the cylinder is determined using weight sensors in the system. The system used three sensors to obtain the average for great accuracy. The level is then converted to a percentage and relayed to the user through the GSM module, keeping them informed of the LPG level inside the cylinder. The device's safety protocol is quite important. All types of alerts are covered by the system, which includes a buzzer for audible alarms, LEDs for visual indication, and an LCD for readable status information. The GSM module also sends SMS to customers in an emergency to keep them safe.

Keywords: LPG, GSM, LCD, and LED

I. INTRODUCTION

The Internet of Things (IoT) is a vital daily technology that allows people to live longer and wiser lives [1] [2] [3] [4]. The Internet of Things (IoT) is a technology that links machines to the cloud. Data may be sent between linked devices on an available network using this technique [5] [6]. The user can utilize the internet to access data and operate equipment from anywhere on the planet [7] [8]. It's a web-enabled ecosystem made up of gadgets that use computers, sensors, and other communication hardware to gather and transmit data [9]. IoT allows us to build machine-to-machine or device-to-device connections without requiring human interaction [10] [11] [12]. It also makes advantage of computer processing power [13][14][15][16][17][18][19][20][25][26][27]. Liquefied petroleum gas (LPG) cylinders are still widely used in most houses, despite the advent of electrical induction stoves. This project intends to provide a gadget that allows users to monitor the quantity of gas in their containers and identify leaks if they occur, especially for those who rely on the availability of cooking gas. This chapter gives an outline of the project's execution plan as well as an overview of the project's main objectives. Most of us have experienced the unexpected news of empty cylinders that comes without warning or indication. It may be a few hours without lunch or supper at home, but it implies lost customers and money for companies such as restaurants. Due to the incorrect storage circumstances, keeping several cylinders might be risky. To be kept safe, these cylinders require not just room but also sufficient ventilation. According to a Canadian report on the ten most prevalent causes of home fires. The most common cause of fire is cooking equipment. Most fires are caused by improper valve installation, failed cylinders, or rapid gas discharge. Some tools are used to mechanically monitor gas flow, allowing for a prompt shut down of the valve in the event of a fire. These devices just monitor the primary valve and do not have any smart sensing capabilities to detect gas leaking from additional holes. The purpose of this study is to provide a gadget that monitors the gas within the cylinder and detects any gas leaking surrounding it. The method for determining the availability of gas within a container based on the cylinder's weight. The system makes use of sensors to monitor gas concentrations in the environment. During an emergency, the smart system provides visual and audio feedback to inform consumers. The smart gadget is designed to detect leaks and monitor gas availability inside the cylinder. The system employs fixed information about the weight of the cylinders to calculate the percentage, which is calculated by treating the first recorded weight as full and subtracting from there. Because of the measurement scale, the weight measuring sensor is situated beneath the cylinder and may not be suited for all types of cylinders. The gas sensor utilized isn't designed to detect a specific sort of gas; instead, it simply measures the density of gas in the air, independent of its type or hazard level. The goal of the article is to develop a full system that converts any LPG cylinder into a smart one that provides relevant information to consumers. The following are the project's objectives:

i. Consumers should be informed about the availability of gas in percentages. The information acquired from the weight sensors and the gas sensor is shown on an LCD. Once the cylinder is placed, it records the weight and calculates the weight reduction over time.

ii. During operating, provide visible and audio indications (LEDs). During operation, there are two LEDs that respond to the system state. If everything is working well, the green LED will illuminate, and in an emergency, the red LED and buzzer will illuminate.

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10539

iii. Customer service feedback: The system employs a GSM module to notify customers about the current state of the cylinder as well as the amount of gas available.

iv. Detecting gas leaks: The gadget features a gas sensor that detects gas leaks and alerts the user.

II. LITERATURE REVIEW

Others' work in the same field is displayed in this section. As with every work, it is influenced by the work of others. It emphasizes the information from such systems as it relates to the paper's goals. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. The apparatus depicted [21] is a cylinder measurement system for LPG. It is based on measuring the gas pressure flow out of the cylinder. It tries to address the issue of cooking gas running out without warning, producing a difficulty now. The researchers suggested that you check at the gas's density as well as its temperature. This article focuses on giving the Indian consumer a gadget that would display him how much gas is left in the cylinder. The goal of [22] is to figure out where gas is leaking from the cylinders. Gas leakage is one of the most serious issues that can endanger human life or cause significant financial losses to business owners and factories. This article suggests developing a system that detects leaks and alerts the location's owner through text message. A gas sensor is used in this study to detect a gas leak from a gas cylinder. Using a PIR sensor, the technology prohibits humans from being in the area during a dangerous gas leak. This project, as shown in Figure 3.3, includes a GSM module that sends text messages to users informing them of the presence of people during a gas leak and the need to attend to them as quickly as possible if it is a kid. Starting with the load cell that translates to the power signal, the next article describes the operational system. The gas sensor detects the presence of gas and then creates a voltage pulse. Because these pulses are so tiny, they require amplification and loudspeaker amplification. Converts analog signals to digital signals and sends them to the controller [23]. The study focuses on employing sensors to detect both fire and gas leaks in the house and sending SMS to the owner with orders so that they may be alerted and respond quickly. The system contains a built-in display that indicates the current state of the system. The system, as shown in Figure 3.5, uses a fan coupled to a relay to halt the flow and prevent gas concentration. For in-house attendees, this gadget offers an audible and visual signal. The GPS module, which locates the location of the fire in the house, is a new addition to the system [24].

III. SYSTEM IMPLEMENTATION

This section focuses on the system's technological operations. It goes over the many components that make up the entire system. The results of this chapter establish the viability of the objectives' needs. Also includes a block diagram for the hardware components and a flowchart for the software element of the system's early phases.

The system block diagram, which includes all the major components, is shown below. The Arduino UNO serves as the brain of the system. The digital button is controlled by a single digital input (DI). The tree load cell sensors have four analog inputs. The digital output (DO) system action list consists of four LEDs, one relay, and a buzzer for audio output.

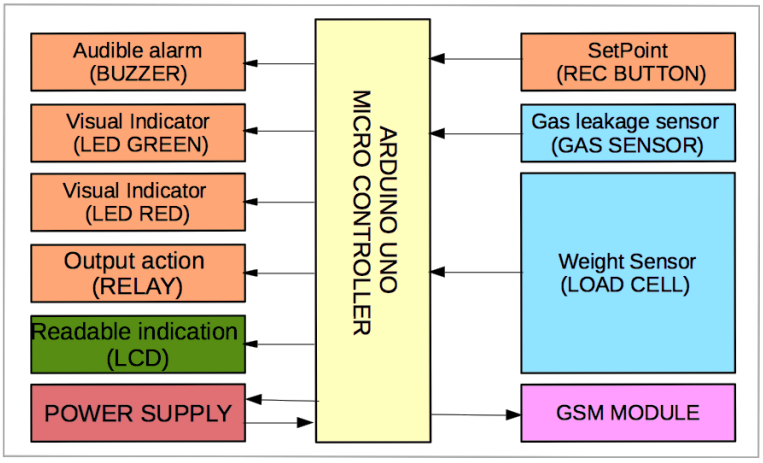

Fig. 1 Proposed block diagram

This gadget has a single 5V primary power supply that powers the whole system. For the LCD and GSM modules, the system employs two types of communications: I2C and UART. The system initializes prior numbers and data as soon as the device is turned on. The system first runs a setup software to set up all of the properties before going into operation. The system will wait for user permission before beginning work by pushing the REC button, which takes the numbers

IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 7.047 ⁜ Vol. 10, Issue 5, May 2022

DOI: 10.17148/IJIREEICE.2022.10539

from the three load cells and averages them. The system will then go into a loop, logging the weight's value and showing the changes as they occur throughout operation. As soon as a new level is achieved, the system sends an SMS stating the amount of gas in the cylinder. It also shows the values on the LCD and lights up a green LED. When the gas sensor detects a gas level over normal, it activates the buzzer and red LED for direct warning to anyone nearby, as well as sending an SMS to a registered number and turning on the valve's relay.

IV. RESULTS

The hardware components are shown in this diagram before being installed in the final container. As seen on the left side of the diagram, the LCD, GSM, and gas sensor are all joined to the strip board for a secure connection. For the final design, the load sensors are positioned away from the board. The finished design, which is divided into two pieces, is displayed. One is put under the gas cylinder, while the other is kept nearby in case of a gas leak. Figure 2 and 3 shows the complete design and prototype.

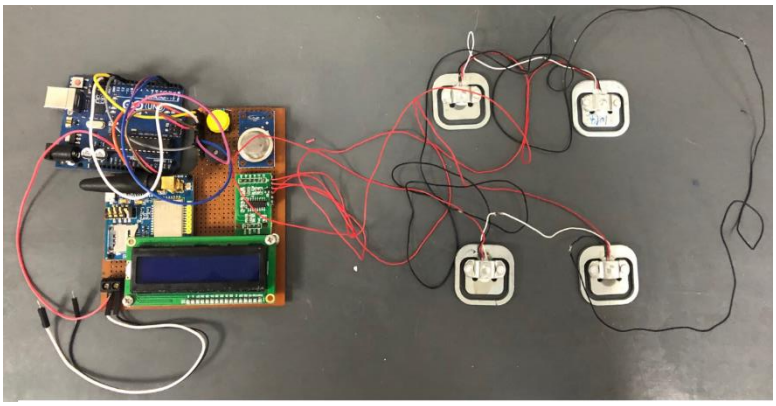

Fig. 2 Complete design

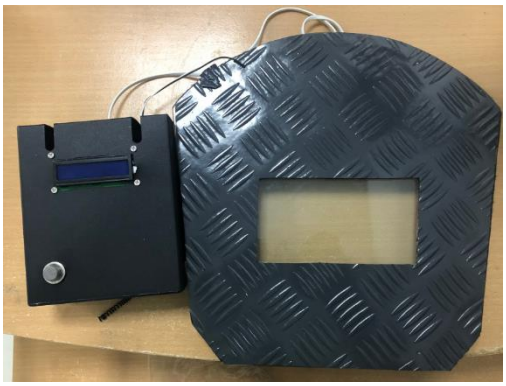

Fig. 3 Final Prototype

V. CONCLUSION

The LCD that shows the information acquired from the weight sensors and the gas sensor informs users of the availability of gas inside the cylinder. During operation, there are two LEDs that respond to the cylinder status. If everything is working well, the green LED will illuminate, and in an emergency, the red LED and buzzer will illuminate. The GSM module sends an SMS to the user informing them of the cylinder's status as well as the amount of gas remaining in the cylinder. The gadget contains a gas sensor that detects gas leaks and alerts the user by displaying the information on the LCD, triggering the buzzer, and sending an SMS. More sensors may be added to the system in the future to avoid significant difficulties. The employment of a temperature sensor in the system to report the temperature parameter would be ideal, as it might affect the cylinder's safety. If a fire breaks out near the cylinder, a fire detector is also a smart idea. It's a good idea to add a fan to get rid of any gas that has leaked, as well as a water supply in case of a fire.

DOI: 10.17148/IJIREEICE.2022.10539

REFERENCES

[1] S. R. R. D. Purusothaman, R. Rajesh, K. K. Bajaj and V. Vijayaraghavan, "Implementation of Arduino-based multi-agent system for rural Indian microgrids," in *2013 IEEE Innovative Smart Grid Technologies-Asia (ISGT Asia)*, Bangalore, India, 10-13 Nov. 2013.

[2] K. M. Y. S. A. H. A. B. K. Shaik Mazhar Hussain, An efficient interface selection scheme (dsrc/lte) of vehicles for data dissemination enabling v2v communication to support internet of vehicles (iov), Springer, Singapore: Soft Computing and Signal Processing, 2022.

[3] K. M. Y. M. A. A. M. A. A. A. S. M. H. Arif Hakimi, "A Survey on Internet of Vehicle (IoV): A pplications & Comparison of VANETs, IoV and SDN-IoV," *ELEKTRIKA-Journal of Electrical Engineering,* vol. 20, no. 3, pp. 26-31, 2021/12/27.

[4] K. M. Y. Shaik Mazhar Hussain, "Dynamic Q-learning and Fuzzy CNN Based Vertical Handover Decision for Integration of DSRC, mmWave 5G and LTE in Internet of Vehicles (IoV).," *J. Commun.,* vol. 16, no. 5, pp. 155-166, 2021/5.

[5] S. M. H. Afaq Ahmad, "Handover Latency and Interoperability in Future Generation Wireless Mobile Heterogeneous Environment," *Oriental Journal of Computer Science and Technology,* vol. 12, no. 3, 2020.

[6] K. M. Y. S. A. H. R. A. Shaik Mazhar Hussain, "Performance evaluation of vertical handover in Internet of Vehicles," *International Journal on Smart Sensing and Intelligent Systems,* vol. 14, no. 1, pp. 1-16, 2021/6/28.

[7] S. M. H. A. F. Hassan Mohammed Obaid Al Marzuqi, "Device activation based on voice recognition using Mel frequency cepstral coefficients (MFCC's) algorithm," *Int. Res. J. Eng. Technol,* vol. 6, no. 3, pp. 4297-4301, 2019.

[8] S. S. K. A. H. S. M. H. Anilloy Frank, "Design and development for detection and prevention of ATM skimming frauds," *Indonesian Journal of Electrical Engineering and Computer Science,* vol. 17, no. 3, p. 1224~1231, 2020/3.

[9] I. Z. A. B. K. Shaik Mazhar Hussain, "Interoperability in Future Generation Wireless Communication Systems-A Review," *Solid State Technology,* vol. 63, no. 1s, pp. 1250-1257, 2020/1/31.

[10] S. A. S. A. S. A. F. Shaik Mazhar Hussain, "IOT based Monitoring and Detection of Electromagnetic (EM) Radiation Levels," *Journal of Student Research,* 2019.

[11] S. M. H. A. F. Ammar Yasir Hamood Al Rawahi, "Design and Development of IOT based Low Power Consumption in Employee Meeting Rooms," *Journal of Student Research,* 2019.

[12] K. M. Y. S. A. H. P. E. N. Shaik Mazhar Hussain, "A review of interoperability issues in Internet of vehicles (iov)," *International Journal of Computing and Digital Systems,* vol. 8, no. 1, pp. 73-83, 2019/1/1.

[13] S. J. B. Shaik Mazhar Hussain, "Design of women safety system using RFID,8051microcontroller and GSM based technology a prototype," *International Journal of Advanced Research in Computer and Communication Engineering,* vol. 3, no. 6, p. 2, 2014.

[14] M. H. S. Jhani Bhasha Shaik, "Voter Identification and Detection System using RFID and GSM to stop rigging in the elections," *INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING,* vol. 2, no. 6, p. 3, 2014.

[15] K. M. Y. S. A. H. Shaik Mazhar Hussain, "A conceptual framework on IOT based system designto prevent road accidentsin accident prone cities," in *2017 International Conference on Infocom Technologies and Unmanned Systems (Trends and Future Directions) (ICTUS)*, Dubai, 2017.

[16] K. M. Y. S. A. H. Shaik Mazhar Hussain, "Interoperability Issues in Internet of vehicles- A Survey," in *2018 3rd International Conference on Contemporary Computing and Informatics (IC3I)*, India, 2018.

[17] K. M. Y. S. A. H. Shaik Mazhar Hussain, "Interoperability in Connected Vehicles – A Review," *I.J. Wireless and Microwave Technologies,* vol. 1, no. 11, p. 11, 2018.

[18] M. V. T. Suprita M. Patil, "IoT based solar energy monitoring system," in *2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)*, Chennai, India, 2017.

[19] E. Kabalci, A. Gorgun and Y. Kabalci, " 4th International Conference on Power Engineering, Energy and Electrical Drives," in *4th International Conference on Power Engineering, Energy and Electrical Drives*, Istanbul, Turkey, 13-17 May 2013.

[20] L. Wang and K.-H. Liu, "Implementation of a web-based real-time monitoring and control system for a hybrid wind-PV-battery renewable energy system," in *2007 International Conference on Intelligent Systems Applications to Power Systems*, Kaohsiung, Taiwan, 5-8 Nov. 2007.

[21] Abhishek B., Bharath P., Gunasheel B ., Vinodh K., Veeresh H. (2016) "Automation of LPG Cylinder Booking and Leakge Monitoring system". International Journal of Combined Research & Development 5,693-695

DOI: 10.17148/IJIREEICE.2022.10539

[22] Dr. Ravichandran S. (2017) "Cloud Connected Smart Gas Cylinder Platform Senses LPG Gas Leakage Using IOT Application ". International Journal of MC Square Scientific Research 9, 324-330

[23] Pathak N., Shaikh A., Varalikar A., Thakur T.(2016) " LPG Gas Detector using a GSM Module". International Journal of Computer Systems 3,307-313

[24] Vinoth M., Santhoshkumar S., Maria G., Sujatha V. (2016) "Habitual Booking System for LPG with Leakage and Fire Sensing Sanctuary'". International Journal of Advanced Engineering Research

[25] S. M. Hussain, K. Mohamad Yusof, S. Ashfaq Hussain, R. Asuncion, and S. Ghouse, "Integration of 4G LTE and DSRC (IEEE 802.11p) for Enhancing Vehicular Network Performance in IoV Using Optimal Cluster-Based Data Forwarding (OCDF) Protocol", *Int. J. Interact. Mob. Technol.*, vol. 15, no. 14, pp. pp. 111–124, Jul. 2021.

[26] Hussain, S.M., Yusof, K.M., Hussain, S.A., & Asuncion, R. (2021). Performance evaluation of vertical handover in Internet of Vehicles. *International Journal on Smart Sensing and Intelligent Systems, 14*, 1 - 16.

[27] Hussain, S., Yusof, K., Asuncion, R., & Hussain, S. (2021). Artificial intelligence-based handover decision and network selection in heterogeneous internet of vehicles. *Indonesian Journal of Electrical Engineering And Computer Science*, *22*(2), 1124. https://doi.org/10.11591/ijeecs.v22.i2.pp1124-1134