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# LPG Leakage Detection and Prevention System

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### ABSTRACT

For lives security and satisfaction of social obligations, and keeping in centre the dangerous examples of impacts and wounds because of spillage of gas in enterprises, vehicles and houses, a gas spillage framework has been structured whereby utilization of installed frameworks and association of Internet of things (IoT) in it, a framework is gotten that empowers us not exclusively to advise the concerned individual yet additionally hold onto any spillage of gas. In the paper, a framework has been proposed which diminish the odds of accidents and guarantee security by the virtue of existing electronics and technology.

Keywords: Arduino Uno, NodeMCU, 16\*2 LCD Display, MQ-6 Gas Sensor, Buzzer, DC motor(9V), Relay.

#### **1. INTRODUCTION**

The significance of safety measures when utilizing Liquefied Petroleum Gas (LPG) in India is paramount due to the potential risks associated with gas leaks. LPG, a widely used cooking fuel, is not only affordable and readily available but also flammable. Gas leaks, often stemming from worn-out gas tubes or old pipes, can lead to hazardous situations. The proposed solution involves a computer-designed software system equipped with an LPG gas detector. This system detects gas leaks swiftly and triggers a set of safety responses, including activating hazard

lights, sounding an alarm, displaying information on an LCD, and sending email notifications.

The proactive nature of this system ensures a rapid and efficient response to potential hazards, enhancing safety in environments such as hotels and high-tech homes.

#### 2. LITERATURE REVIEW

The LPG leakage detection and prevention kit is designed to address the potential hazards of gas leaks associated with LPG usage. Built on NodeMCU and Arduino UNO boards, it employs an MQ6 gas sensor to detect LPG gas leakage. Upon detection, the NodeMCU triggers the Arduino UNO, resulting in the transmission of a "LPG gas leakage detected" notification to a mobile device, offering real-time alerts to users.

In addition to the mobile notification feature, the kit includes various safety responses such as activating a bell, illuminating LEDs, and engaging a DC motor fan for gas expulsion when gas levels exceed the predefined threshold of 530ppm. This comprehensive system not only enhances safety and security but also ensures timely and accessible alerts to users through mobile notifications, enabling swift response to potential hazards.

on the display, and it will be turned off. The major apparatus required for this project are

- 1. Arduino UNO
- 2. LPG Gas sensor Module (MQ-6)
- 3. Buzzer
- 4. NodeMCU
- 5. 16x2 LCD
- 6. Bread board
- 7. 9V DC Motor

#### **BLOCK DIAGRAM**

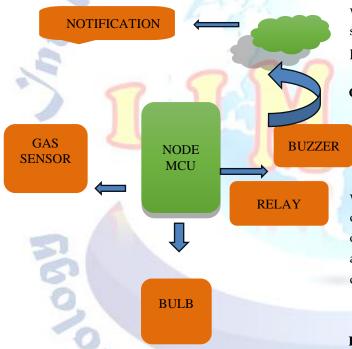


Fig:BlockDiagram

## 3.COMPONENTS: FUNCTIONS OF COMPONENTS Arduino UNO:

The Arduino UNO is a kind of open - source microcontroller which is depend upon the Microchip ATmega328P micro controller and it was created by Arduino.cc. This board is equipped with multiple sets of computerized and even simple information that may be used for different applications and with different circuits.

#### A. NodeMCU:

NodeMCU is also an open - source IoT board. It is integrated with firmware which will run using the ESP8266 Wi-Fi SoC, and the apparatus which is depended on the ESP-12 module. The expression of "NodeMCU" as a matter of course that refers to the firmware that has opposed to the improvement of units. This firmware will be using the Lua scripting language.

#### **B.** LPG Gas Sensor:

The MQ6 is an LPG gas detecting sensor that will be used for detection of gases within less time of leakage. So, it was used mostly for detecting the spillage of gases from the gas cylinders or other gas sources. It will be used for many industrial purposes and this sensor can detect the gases like iso-butane, LPG, propane, LNG [1].

#### C. Power Supply:

Every electronic system needs power from any principle supply by any methods for a greater stage down transformer up to change over 230V AC essential into a 0-12V or 500mA support. So, a full wave connect rectifier which is pursued by many capacitor channels will be used to provide the voltage of 5V to the electronic boards whose yield will be used as power supply requirements of micro controller circuits.

#### D. Buzzer:

A buzzer is an electromechanical device designed to produce a buzzing or beeping sound when an electric current passes through it. It is commonly used for various applications to provide audible alerts, notifications, or alarms. Buzzer construction typically includes a coil of wire, a diaphragm or a piezoelectric element, and a housing to amplify and project the sound. A buzzer is a versatile and widely used component in electronics, offering an audible signaling mechanism that is valuable for safety, communication, and various other applications.

#### E. Relay:

A relay is an electromechanical switch that uses an electromagnetic coil to control the opening and closing of one or multiple sets of contacts. Relays are commonly used to control high-voltage electrical devices or systems with a low-voltage signal. A relay consists of an electromagnetic coil, a set of movable contacts (typically called "poles"), and stationary contacts ("terminals"). When the coil is energized, it generates a magnetic field that pulls the movable contacts to make or break a connection with the stationary contacts.

#### 4.PROCEDURE

- Connect the gas sensor to the NodeMCU. Typically, the analog output of the gas sensor is connected to an analog pin on the NodeMCU
- Connect the buzzer to a digital pin on the NodeMCU.
- > connect the relay module to another digital pin
- on the NodeMCU (e.g., D2). Connect the relay's control pins appropriately.
- Connect the bulb to the relay module. When the
- relay is triggered, it should control the power supply to the bulb.
- Set up an account on your chosen cloud service platform.
- Obtain necessary authentication tokens or API keys for NodeMCU integration.
- Write a program in the Arduino IDE that reads the gas sensor values, checks for a gas leak, and triggers actions accordingly.
- Implement logic to activate the buzzer, trigger the relay, and send data to the cloud service.
- Modify the Arduino code to include the cloud service integration.
- Configure the NodeMCU to send data to the cloud service when a gas leak is detected.
- Set up notifications on the cloud service platform to send alerts to your mobile device when a gas leak is detected.
- Connect the NodeMCU to your computer, select the appropriate port and board in the Arduino IDE, and upload the code to the NodeMCU.
- Simulate a gas leak scenario and observe the system's response.

- Check if the buzzer activates, the relay controls the bulb, and notifications are received on the mobile device.
- Install the gas detection system in the desired location.
- Ensure that all connections are secure and follow safety guidelines for electrical installations

#### A.VI.EXPERIMENTAL RESULTS



B. Fig-2: MQ-6 Sensor readings when no Gas leakage

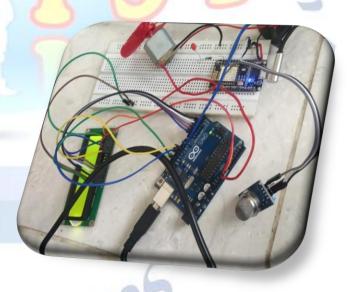


Fig-3: Output when no Gas leakage

File	Edit	Shell	Debug	Options	Window	Help
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	292					
	291					
	303					
	308					
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	297					
	296					
	293					
	291					
	290					



Fig-5: Output when GAS leakage was detected

#### CONCLUSION

The LPG leakage detection system, comprising components like the gas sensor, NodeMCU, buzzer, relay, bulb, cloud service, and mobile device, offers a robust solution. This integrated setup ensures timely detection of gas leaks, triggering audible and visual alerts locally, while cloud services provide instant notifications to mobile devices, enhancing safety and enabling swift responses.

Given the given highlights this framework can be made increasingly useful by including not many progressively essential little data sources like

- 1. Temperature: To screen the temperature of the chamber just as nature and program the framework to act as needs be. (Note: Piccolo includes on-chip temperature sensors and LEDs).
- 2. Although this framework is profited by IOT for messaging and informing this can be made colossal by enhancing it with Android and GSM for messaging and informing [5].

3. Sensors: Continuous and profitable inclusion and the expansion of applicable and up and coming new innovation-based sensors would influence to a great extent to the believability of the framework.

#### Conflict of interest statement

Authors declare that they do not have any conflict of interest.

# REFERENCES

- [1] AKM Jahangir A. Majumder ; Yousuf Elsaadany ;
- Mohammed Elsaadany ; Donold R. ucci ; Farzana Rahman, "A
  Wirelesss IoT System Towards Gait Detection in Stroke Patients",
  2017 IEEE International Conference on Pervasive Computing and
  Communication Workshops, DOI:
  10.1109/PERCOMW.2017.7917605
- [3] Bamberg, Stacy & Y Benbasat, Ari & Scarborough, Donna & E Krebs, David & Paradiso, Joseph. (2008).
- [4] Gait Analysis Using a Shoe- Integrated Wireless Sensor System. IEEE transactions on information technology in biomedicine : a publication of the IEEE Engineering in Medicine and Biology Society, 12, 413-23. 10.1109/TITB.2007.899493.
- [5] RAMA MURTHY.N, P.N.SUDHA, "Smart Navigation System for Visually Challenged People", International Journal of Industrial Electronics and Electrical Engineering, ISSN:2347-6982
- [6] Anwar, Ashraf. (2017). A Smart Stick for Assisting Blind People. IOSR Journal of Computer Engineering. 19. 86-90 10.9790/0661-1903028690.
- [7] Divyakumar N, Ganesh V S ,Vishnuraju G , Yogesh P and Sangappa S B, "Production of Electricity Through Pressure Based Sensors", International Journal of Computer Sciences and Engineering, Vol.04, Special Issue.03, pp.188-191, 2016.
- [8] Zhao, N. (2010). Full-featured pedometer design realized with 3-axis digital accelerometer. Analog Dialogue. 44. 1-5.
- [9] Wahab, Yufridin& Abu Bakar, Nor Atikah & Anuar Mahayudin, Ahmad Fitri& Hamzah, Fazmir& Zainol, Zulhilmi&Mazalan, Mazlee. (2014). Development of Shoe Attachment Unit for Rehabilitation Monitoring. Procedia Computer Science. 42. 46 - 53. 10.1016/j.procs.2014.11.032.
- [10] Elham Maghsoudi Nia1, Noor Amila Wan Abdullah Zawawi2 and Balbir Singh Mahinder Singh, "A review of walking energy harvesting using piezoelectric materials", IOP Conf. Series: Materials Science and Engineering 291 (2017) 012026 doi:10.1088/1757-899X/291/1/012026
- Hita Prem, Ashika N, Shilpa N, "Arduino Based Human Airbag System for Fall Protection for Elderly", International Journal of Current Engineering and Scientific Research(IJCESR),ISSN:2394-0697,Vol.5,Issue-5,2018
- [12] A.Jinish Bobby, B.Karthika, R.Savitha, Dr. M.Caroline Viola Stella Mary,"Wearable Fall Detection, MonitoringAnd Alert System",International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)Vol. 6, Issue 5, May 2019
- [13] Sk, K. B., Roja, D., Priya, S. S., Dalavi, L., Vellela, S. S., & Reddy, V.
  (2023, March). Coronary Heart Disease Prediction and Classification using Hybrid Machine Learning Algorithms. In

2023 International Conference on Innovative Data Communication Technologies and Application (ICIDCA) (pp. 1-7). IEEE.

- [14] Vellela, S. S., Reddy, B. V., Chaitanya, K. K., & Rao, M. V. (2023, January). An Integrated Approach to Improve E-Healthcare System using Dynamic Cloud Computing Platform. In 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT) (pp. 776-782). IEEE.
- [15] Ultrasonic Dan Internet of Things (Iot) Pada Lahan Parkir Diluar Jalan," Pros. Semnastek, no.November, pp. 1–2, 2017
- [16] U. N. Yogyakarta and S. Parking, "Smart parking berbasisarduino uno," no. 12507134001
- [17] S.Sarayu and V.V.Bongale, "Design and Fabrication of Prototype of Automated Smart Car Parking System using Programmable Logical Controllers (PLC)," Int. J. Sci. Eng. Technol., vol. 2, no. 9, pp. 857–860, 2013.
- [18] J. Yang, J. Portilla, and T. Riesgo, "Smart parking service based on Wireless Sensor Networks," IECON 2012 - 38th Annu. Conf. IEEE Ind. Electron. Soc., pp. 6029–6034, 2012.
- [19] S. S. Priya, S. Srinivas Vellela, V. R. B, S. Javvadi, K. B. Sk and R. D, "Design And Implementation of An Integrated IOT Blockchain Framework for Drone Communication," 2023 3rd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2023, pp. 1-5, doi: 10.1109/CONIT59222.2023.10205659.
- [20] N. Vullam, K. Yakubreddy, S. S. Vellela, K. Basha Sk, V. R. B and S. Santhi Priya, "Prediction And Analysis Using A Hybrid Model For Stock Market," 2023 3rd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2023, pp. 1-5, doi:10.1109/CONIT59222.2023.10205638.
- [21] D, Roja and Sunkara, Santhi Priya, The Airborne Internet Technology Using HALO (June 17, 2023). INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS), Vol. 03, Issue 06, June 2023, pp : 221-226, Available at SSRN: https://ssrn.com/abstract=4483085
- [22] D, Roja and Javvadi, Sravanthi and Dalavai, Lavanya and Vullam, Nagagopiraju and Chaitanya, Kancharla K and Sunkara, Santhi Priya, The Word Guessing Game with Voice Assistant (April 25, 2023). Roja D, Sravanthi Javvadi, Lavanya Dalavai, Nagagopiraju
- [23] Vullam, Kancharla K Chaitanya, "THE WORD GUESSING GAME WITH VOICE ASSISTANT',IJRAR - International Journal of Research and Analytical Reviews (IJRAR), E-ISSN 2348-1269, P-ISSN 2349-5138, Volume.10, Issue 2, Page No pp.1-9, April 2023, Available at SSRN: https://ssrn.com/abstract=442876
- [24] Praveena, M., Dubisetty, V. B., Varaprasad, K. V., Rama, M., Vadana, P. S., & Sai, T. S. R. (2023, September). An In-Depth Analysis of Deep Learning and Machine Learning Methods for Identifying Rice Leaf Diseases. In 2023 4th International Conference on Smart Electronics and Communication (ICOSEC) (pp. 951-955). IEEE.
- [25] K. K. Kommineni, S. J. Basha, M. Sandeep, P. S. Vadana, T. S. R. Sai and D. S. Kumar, "A Review on IoT-based Defensive Devices for Women Security," 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, India, 2023, pp. 99-104, doi: 10.1109/ICACCS57279.2023.10113015.

- [26] Sk, K. B., Roja, D., Priya, S. S., Dalavi, L., Vellela, S. S., & Reddy, V. (2023, March). Coronary Heart Disease Prediction and Classification using Hybrid Machine Learning Algorithms. In 2023 International Conference on Innovative Data Communication Technologies and Application (ICIDCA) (pp. 1-7). IEEE.
- [27] Vellela, S. S., Reddy, B. V., Chaitanya, K. K., & Rao, M. V. (2023, January). An Integrated Approach to Improve E-Healthcare System using Dynamic Cloud Computing Platform. In 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT) (pp. 776-782). IEEE.
- [28] Kumar, K. K., Kumar, S. G. B., Rao, S. G. R., &Sydulu, S. S. J. (2017, November). Safe and high secured ranked keyword searchover an outsourced cloud data. In 2017 International Conference on Inventive Computing and Informatics (ICICI) (pp. 20-25). IEEE.
- [29] Kommineni, K. K., Pilli, R. B., Tejaswi, K., & Siva, P. V. (2023).
  Attention-based Bayesian inferential imagery captioning maker. Materials Today: Proceedings.
- [30] Kommineni, K. K., Madhu, G. C., Narayanamurthy, R., & Singh, G. (2022). IoT Crypto Security Communication System. In IoT Based Control Networks and Intelligent Systems: Proceedings of 3rd ICICNIS 2022 (pp. 27-39). Singapore: Springer Nature Singapore.
- [31] Kommineni, K. K. ., & Prasad, A. . (2023). A Review on Privacy and Security Improvement Mechanisms in MANETs. International Journal of Intelligent Systems and Applications in Engineering, 12(2), 90–99.

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