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ARDUINO BASED AUTOMATIC GAS LEAKAGE DETECTION SYSTEM

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Abstract: Gas leakage is a significant danger across the world that affects many companies, homes, and gas-fueled vehicles. To deal with this, preventative measures are needed. The gas leak detection system of today's high-tech design intends to locate any such gas leaks quickly and alert the users to the many prospective dangers. The microprocessor and MQ5 gas detector are integrated into the system's phenomenal automatic features such as window driving, exhaust gas control, and buzzer warning, as well as automatic power switching. The use of the most contemporary technology ensures that safety procedures are carried out in a safe and efficient manner. An Arduino microcontroller monitors key gas levels throughout the period of the day and night to ensure that any dangers are quickly addressed and the user safety is maintained. There is significant improvement being made to prevent gas leaks therefore, it is a big leap toward increasing safety measures for different industries. This innovative action makes a statement about using modern technologies to save human lives and physical property in advance and not in reaction to security threats.

Index Terms **- Gas leakage, internet of things, LPG, alarm system**

I. INTRODUCTION

Propane and butane are mixed gases that make up LPG gas. These gasses have the hazardous characteristic of rapidly catching fire [1]. LPG is utilized as fuel, a propellant, and a cooler fluid. Gas leaks have the potential to cause a catastrophic explosion. The number of people dying as a result of gas cylinder explosions has gone up recently. Therefore, from a safety perspective, leakage control is crucial. One notable instance of a disaster brought on by a gas leak is the Bhopal gas tragedy. The discovery of leaks is not the only crucial aspect of leak control. LPG is typically utilized in homes and businesses. It is primarily used for cooking in homes. Gas leaks can occur in residential or commercial buildings, as well as in gas-powered cars, albeit they are uncommon. Gas leaks can be extremely hazardous since they raise the possibility of an explosion. To do this, ethanol or another odorant is added to LPG, making it possible for anyone to identify a leak. Some persons, however, may not be able to rely on this safety feature because of a diminished sense of smell. Our project, a leakage detector, can be useful in these situations. Techniques for detecting gas leaks have already been covered in a number of scientific publications.

II. PROBLEM STATEMENT

Our homes make use of LPG gas cylinders for a variety of functions.
A significant portion of the same is cooking and heating water. Therefore, it wouldn't be incorrect to argue that it is essential to our existence. Nonetheless, there have been instances of gas leak-related accidents in the past. The project's main goal is to provide a security system to stop and prevent mishaps brought on by gas leaks [2]. This can be accomplished by developing an identical standalone system and a ready-to-use product.

III. LITERATURE REVIEW

The real-time gas monitoring system and gas leak detection were proposed in [2]. An exhaust fan is used in this system to both detect and regulate gas leaks. Additionally, the LPG level in the cylinder is regularly

checked. According to Ashish Shrivastava [3], there is a project that is used for both house and vehicle safety that involves the detection of two different types of gases: LPG and CNG. The method presented in [4] employs an ARM7 CPU and simulates delivering an SMS warning to the user using "Keil" software. In [5], the authors developed a project that requires manual resets after each scenario and employs two separate sensors to identify leaks. A gas leak detection system was created in [6] to alert people to the presence of poisonous gas; the warning system sends a Short Message Service (SMS) to the relevant person's cell phone via an Arduino UNO and SIM900 GSM/GPRS gateway. The author in [7] had created a device that could measure the percentage and parts per million of gases in order to protect human health from the many harmful gases and dangerous elements, chemicals, and compounds found in the atmosphere. He employed an Arduino Uno R3, an RF24L01Plus Wireless Transceiver Module, and a MQ2 gas sensor in his proposed system. The results were serial monitoring using the Arduino IDE at the receiver side.

IV. COMPONENTS USED

The components which are used in the LPG gas detector and prevention are mentioned with their quantity below:

- Arduino Uno-1
- MQ6(Gas Sensor)-1
- Microcontroller Module-1
- Buzzer-1
- LED-2

V. WORKING OF THE PROPOSED WORK

The flow chart of the proposed method is shown in Fig. 1. Any sophisticated system's operation is mostly dependent on the microcontroller, which manages the device's overall operation. The Arduino Uno is functioning as a conditional switch in this instance. It carries out two sets of actions based on the circumstance that exists. When the gas leak is detected by the sensor, it will sound the buzzer and light up the red LED, signalling a gas leak. When there is no detectable gas leak, the Green Led will be utilized to show "No Gas Leak." The GSM module will notify the appropriate contacts of a "Gas Leak" if the sensor detects the presence of gas in the area [3]. The GSM module won't transmit a message if the sensor in the area doesn't detect any gas. This gadget has a GSM module to alert the concerned parties to any gas leaks occurring at the residence while they are away, allowing for the prompt implementation of required precautions to avoid an accident. In reality, as seen in Fig. 1, as soon as MQ6 detects leakage, it transmits an analog signal to the microcontroller, which then translates it into a digital value. During microcontroller programming, a specific gas threshold value is pre-established. The controller, as seen in the circuit, compares the value that the sensor receives with the threshold value.

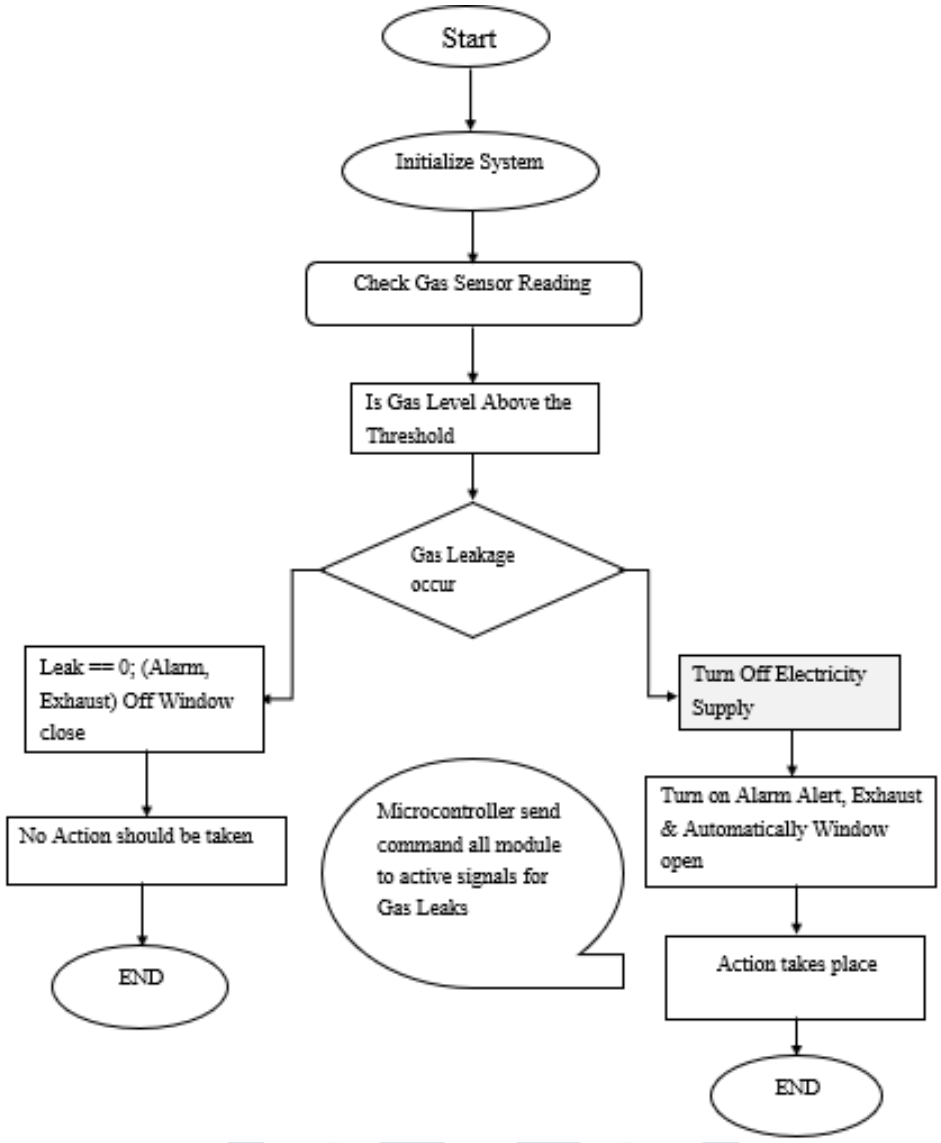

Fig. 1: Flow chart of the proposed methodology

The following two cases will be discussed: The green led will continue to glow if the digital value the sensor receives is less than the threshold value, indicating that there is "no gas leakage" in the area. The green LED in the area indicates "gas leakage" when it becomes red if the received digital value over the threshold value. Additionally, the user receives an emergency text and a buzzer.

VI. RESULTS

A tiny amount of LPG gas was applied close to the sensor to test this device. When the MQ-5 gas sensor detects LPG gas, it alerts the Arduino. Subsequently, Arduino transmits an active signal to additional devices that are connected outside. Consequently, a buzzer sounds and the owner receives a message at the same time.

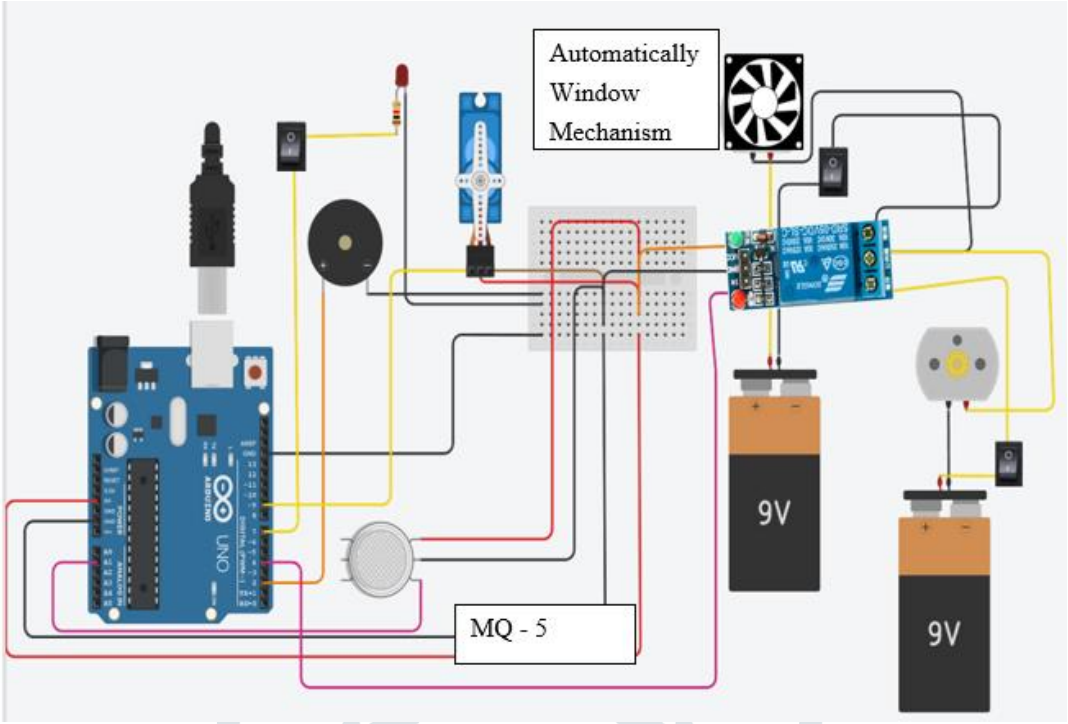

Fig. 2: Hardware implementation of the proposed work

VII. FUTURE SCOPE

The technology can be expanded for a wide range of uses in the future. In addition to detecting gas leaks, the sensor can also identify whether someone is smoking, drinking, or both inside or close to gas stations. If someone is found, they can be quickly removed from the area, maintaining public safety in addition to preventing fires. This technology is also beneficial to other businesses, such as the gas and chemical industries, where products are manufactured using LPG or other gases. In the future, home security is essential, especially in rural areas where LPG leaks frequently cause accidents.

VIII. CONCLUSION

The suggested method for monitoring and detecting LPG gas leaks is designed and simulated. It finds gas leaks in the air and, if they surpass safety limits, uses GSM to send SMS messages to the designated numbers and activates a buzzer. By using this, the user is informed when there is a dangerous or unusual state and can take the appropriate action. With the use of this technology, gas leak-related accidents can be prevented.

REFERENCES:

[1] Padmapriya, R. and Kamini, E. 2013. Automatic LPG Booking, Leakage Detection and a Real Time LPG Measurement Monitoring System, International Journal of Engineering Research and Technology, 2(4), 1192-1195.

[2] Meenakshi Vidya, P., Abinaya, S., Geetha Rajeswari, G., Guna, N. 2014. Automatic LPG detection and hazard controlling, 3(15), 1-4.

[3] Ashish Shrivastava, Ratnesh Prabhakar, Rajeev Kumar and Rahul Verma," GSM Based Gas Leakage Detection System", 2013.

[4] Padmapriya, R., Kamini, E. 2013. Automatic LPG Booking, Leakage Detection and a Real Time LPG Measurement Monitoring System.

[5] Ramya, V., Palaniappan, B. 2012. Embedded system for Hazardous Gas detection and Alerting.

[6] Kumar K. and Sabbani H.S. 2017. Gas Level Monitoring, Booking & Gas Leakage Detector over IoT, International Advance Computing Conference IEEE, 2017.

[7] Mobasshir M. 2019. Toxic and hazardous gas detection, measurement and monitoring system for safety assurance in home and industrial application of wireless sensor node", Engineering and Technology Research, 1(3).

[8] Babuprasanth.V. 2014. Cloud Connected Smart Gas Leakage Detection And Safety Precaution System" International Journal of MC Square Scientific Research, 6(1).

[9] Syeda B. S. and Prasad R. 2020. Gas leakage detection and alerting system using Arduino Uno", Global Journal of Engineering and Technology Advances, 5(3).

[10] Naik P. Dhopte P. Wanode R. and Nagre S. 2018. Gas Sensor Using Arduino UNO & MQ2 Sensor", International Journal of Advanced Research in Computer and Comm. Engineering, 7(3).