WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Kitchen Security Alarm Using MQ-2 Sensor

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ABSTRACT –

A typical residential or business kitchen contains numerous potential risks, such as gas leaks, unattended stoves, smoke, or even unauthorized access to sharp objects, chemicals, or high-temperature appliances. Despite this, there is frequently a lack of adequate monitoring to identify these hazards in real time. This paper proposed a low cost kitchen security alarm using an MQ-2 sensor and LM358 op-amp. The proposed method provides an effective solution to kitchen threats and hence protects various hazardous activity in the kitchen if it happen.

Introduction :

This research paper presents a proposal for developing a crucial safety device designed to protect our homes. Many of us have likely encountered situations in the kitchen where such a device would have been invaluable. Whether it's boiling milk or preparing an entire meal, we've all wondered what it would be like if the gas stove could alert us when we've left it unattended, preventing the milk from spilling or the food from burning. Moreover, it's important to consider the very real danger of a gas leak in the kitchen — a situation that poses serious risks to our health and safety, and could even result in a tragic loss of life.

Gas leaks are one of the problems that often arise in our day-to-day lives; this causes the accident. This accident occurs because of the presence of the gas, which cannot be detected with naked eyes. The LPG is the inflammable mixture of the hydrocarbon gases used as fuel in many applications, like industries, homes, and vehicles. The alarming rise in LPG related explosion has led to a significant increase in fatalities. To avoid such a problem, there is a need for a system to detect the leakage of hazardous gases like LPG and smoke. Gas leak detection is the process of detecting hazardous gas leaks by utilizing the MQ-2 sensor. Multiple designs of LPG detection and alert systems have been proposed. This paper presents the kitchen security alarm system, which uses the MQ-2 sensor, the LM358 op-amp IC, and the NE555 timer IC to detect gas leaks in the kitchen and send audible alerts. Thereby provides a safe and peaceful environment for cooking. The project consumed very little power and can be installed easily in the kitchen.

Working

In voltage regulator. The LM358 is used in the circuit to provide a stable 5V power supply for the entire circuit. The stable supply is important because the other component in the circuit needs the stable supply for accurate operation. Then we have used the MQ-2 sensor, which is highly sensitive to the various gases, including LPG, methane, propane, and butane. When there is leakage of LPG in the kitchen, the sensor's resistance changes, and it produces the corresponding voltage input. Based on the concentration level, output voltage varies. The LM358 will amplify and condition the given signal. The output MQ-2 sensor is connected to one of the inputs of the op-amp LM358, and the other input is connected to the reference voltage. This allows the LM358 op-amp to compare the sensor output with reference voltage. When the leakage exceeds a certain threshold, the output of op-amp LM358 will go high. The output from LM358 will trigger the NE555 timer, making it produce a high output for a specific time duration. Further, the output of the NE555 timer will control the relay. After the NE555 timer completes its timing cycle, the output goes low, turning off the relay.

Table 1: MQ-2 sensor sensitivity [3]

Detecting concentration scope：	
200ppm-5000ppm	LPG and propane
300ppm-5000ppm	Butane
5000ppm-20000ppm	methane
300ppm-5000ppm	H2

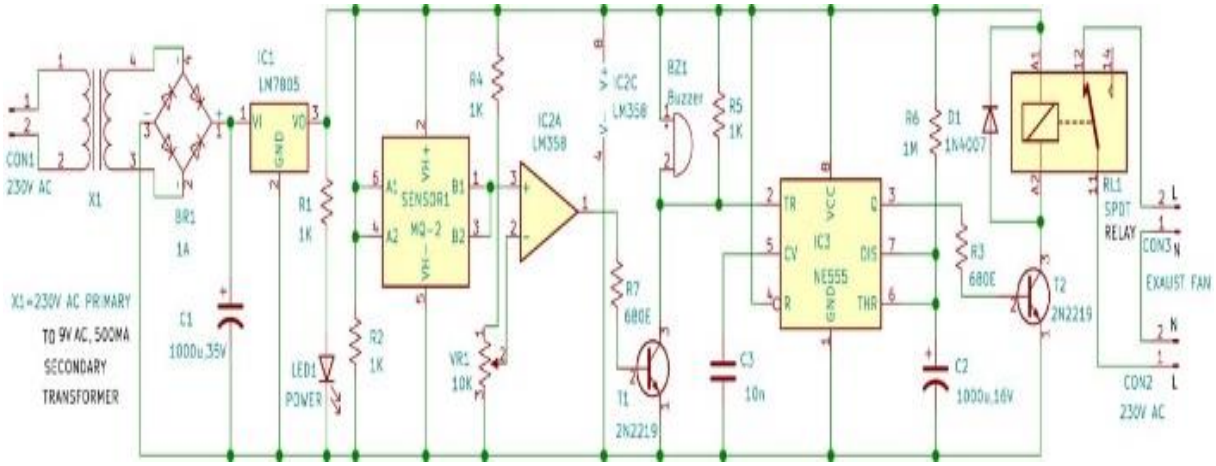

Figure 1: Circuit diagram of proposed system

Need for Project:

The kitchen is more than just a place to cook; it's where we create memories, share meals, and bring our families together.. Yet, despite its importance, It can also be one of the most hazardous spots in the home if proper precautions aren't taken.
Each day, we hear of accidents involving unattended gas stoves and gas leaks, many of which result in tragic outcomes. According to the National Crime Records Bureau, at least 10 people lose their lives every week in India due to gas explosions, with a staggering 82% of the victims being women.

In India alone, there are currently 263 million gas connections, with 224 million of them being active. With government subsidies making LPG connections more affordable, the number of gas users continues to rise each year. While this is a positive development in terms of access to cooking fuel, it also brings with it a greater risk — if not used or maintained properly, gas connections can pose a serious threat to our safety.

As the number of households relying on gas grows, it's crucial that we all take the necessary precautions to ensure the kitchen remains the safest place in our home, rather than a potential hazard.

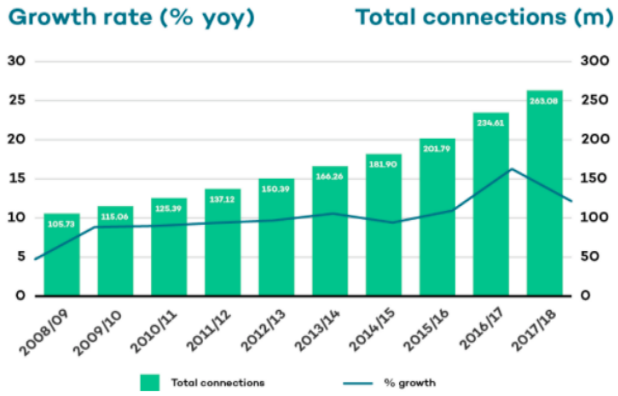

Figure 2: Active connection [2]

Table 2: Results on proposed system

Sensor Event	Gas Detected	Smoke Detected	Exhaust Fan Status	Alarm Status
Initial State	No Gas	No Smoke	OFF	OFF
Gas Detected	LPG/CH_4 etc.	No Smoke	ON	ON
Smoke Detected	No Gas	YES	ON	ON
Gas and Smoke Detected	LPG/CH_4 etc.	YES	ON	ON

Gas Level Drops (Safe)	No Gas	No Smoke	OFF	OFF
Smoke Level Drops (Safe)	No Gas	No Smoke	OFF	OFF

Conclusion-

This work has presented a methodology. For detecting the leakage of gas the sole purpose of this project is to provide a safe and risk-free environment for cooking for domestic as well as commercial restaurants and hotels.

In this paper, we have presented an awareness model to reduce the risk of life due to any leakage of hazardous gas in homes and hotels. The development of a kitchen security alarm system using the MQ-2 gas sensor offers a practical and cost-effective solution to enhance safety in the home. By detecting hazardous gases such as LPG, methane, and carbon monoxide, the system can alert users to potential gas leaks or unsafe conditions, minimizing the risk of accidents like explosions, fires, and poisoning. With the increasing number of gas users worldwide, particularly in households, such a system becomes a vital tool in ensuring kitchen safety. By incorporating real-time alerts and the ability to monitor gas levels continuously, this technology can provide peace of mind, helping prevent dangerous situations before they escalate. As we move toward more connected and automated homes, integrating simple yet effective safety devices like the kitchen security alarm using MQ-2 sensor will play a crucial role in protecting our families and loved ones. This project is a significant effort in saving the lives of number of people.

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