# A Critical Review on LPG Gas Leakage Detection and Monitoring System

(Kajian Kritikal terhadap Sistem Pengesanan dan Pemantauan Kebocoran Gas LPG)

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**Abstract**

This paper reviews past, existing, and future gas leakage detection and monitoring systems. Over the past few years, there has been an increase in interest in technologies, systems, and procedures to detect and monitor gas leakage in reducing the number of fire accidents and injuries related to subjects. The gas leakage detection activity with a combination of GSM and IoT-based systems has become more important as this medium is more efficient, practical, and cheaper in monitoring capabilities. In January 2018, Fire and Rescue Department Malaysia reported there are 48 cases of accidents that occurred related to gas (Fire and Rescue Department Malaysia, 2018). Thus, this statistic indicates the need for reliable and efficient gas leakage detection and monitoring with a safety system that could alert or warn the user/people at surrounding before any mishaps happen. Several approaches and methods have been developed to reduce the incident related to the subject, which uses the following measures: (1) monitoring-based measures; (2) detection-based measures; (3) tool or mechanical system-based measures. This paper briefly reviews the literature on gas leakage detection, monitoring, and safety systems. The findings from this review are discussed in the light of directions for future studies and the development of gas leakage countermeasures.

Keywords: Arduino, LPG Leakage, Monitoring Gas, Safety, Internet of Things (IoT), GSM modem

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## INTRODUCTION

The emergent technology has brought many advantages and very useful in everyone's life, but it's also encountered harmful to life when safety precaution has not been considered. Liquefied petroleum gas (LPG) is one types of gas that was widely used in many fields such as essential domestic and commercial cooking as a heating fuel such as food trucks, restaurant, industrial oven, and others. LPG can also be used as electric power generators, propellant and fuel vehicles. This gas has been chosen due to its availability, affordability and environmental benefit. This gas is nontoxic and odorless. Ethanethiol as a powerful odorant is added to detect the gas leakage via the sense of smell and it is easily detect by the people (Adekitan et al., 2018). Despite the fact that LPG is known for being environmentally friendly, leakage or disclosure of the gas can have serious consequences as it consists of a flammable mixture that composed of propane and butane. For this result, there are some factors that need to be query while using LPG gas in terms of safety purposes.

As the usage demand of LPG rises in domestic and commercial field, the number of incidents caused by LPG leakage which result an explosion raises as well due to lack of constant checkups and treatment. Normal leakage gas can be easily detected and removed by smell, but the problem arises when there is the leaky gas was seeps on kitchen cabin or electrical installation which difficult to be detect by the sense of human (Hasibuan et al., 2019). The increasing hazard can't be avoided if there are source of fire that located near the leaking gas as mentioned previously as the characteristic of LPG gas are sensitive and flammable. For example, in year 2020 there are seven cases accidents have been reported that involved LPG leakage in Malaysia which causes the entire victim burned (Isahak, 2021; Joni, 2020; Rosedi, 2020; Md Zain, 2020; Suhaini, 2020; Zakarya, 2020).

The key reasons that can cause the leaking of gas cylinders include improper fitting of regulators (Dewi & Somantri, 2018, Rahayu, 2020). This is due to the seal that serves as a sealing gap between the mouth of the gas cylinder valve and the regulator can cause gas form a large gas cloud that will fall to ground as is characteristic is heavier than air. Then it can catch the fire when near the ignition source which can lead to the explosion. Others factor that contributes to the gas leaking are poor quality of tube sealing rings, quality of gas cylinders, and tear gas hose due to animals such as mice (Rahayu, 2020). Therefore, it is compulsory to have a system which constantly monitors the gas cylinder.

In recent years, many researchers have shown interest in the development of monitoring, detecting gas leakage systems and employing safety precaution system to counter the problems. Many mechanisms and method in monitoring and detecting gas leaking such as mechanical device-based, GSM-based and IOT-based has been used. Thus, main aims of this paper are to evaluate the present status of research regarding method on monitoring and detecting LPG gas system and at the same time identify any related tool or system regarding safety to counter the leaking gas.

The paper is organized as: Section II provide a brief systematic process flow in reviewing paper to ensure the research paper was in study scope. Data collection of gas leakage detection, monitoring and safety systems based on previous research and detailed critical review are discussed in Section III. Section IV concludes the paper by stating the forthcoming works.

## METHODOLOGY

Although the LPG gas essential as heating fuel in cooking but it features can brought a disaster if the safety in handling it is not taken seriously. Thus, paper study a detection and monitor LPG leakage technique and corresponded safety device to countermeasure the gas leaking issue in order the ensure the safety. Secondary data method has been applied in data collecting from the previous research and a systematic step has been

showed in Figure 1 below. Based on previous research's, a quantitative is used as designed method which are data was obtained through an experimental by study the effect on the relationship of system such as time taken of sensor detected the leaking gas by vary distance of sensor installed, location of LPG cylinder, and others (Abdul Hannan et al., 2018; Hasibuan et al., 2019; Rahayu, 2020; Sitan & Ab Ghafar, 2018). Hence, the data recorded from previous research helped in the study for this paper.

A systematic scoping review was carried out in order to identify the relevant studies. This method significantly represents the body of literature. There are several systematic steps in reviewing the paper as shown in block diagram Figure 1.

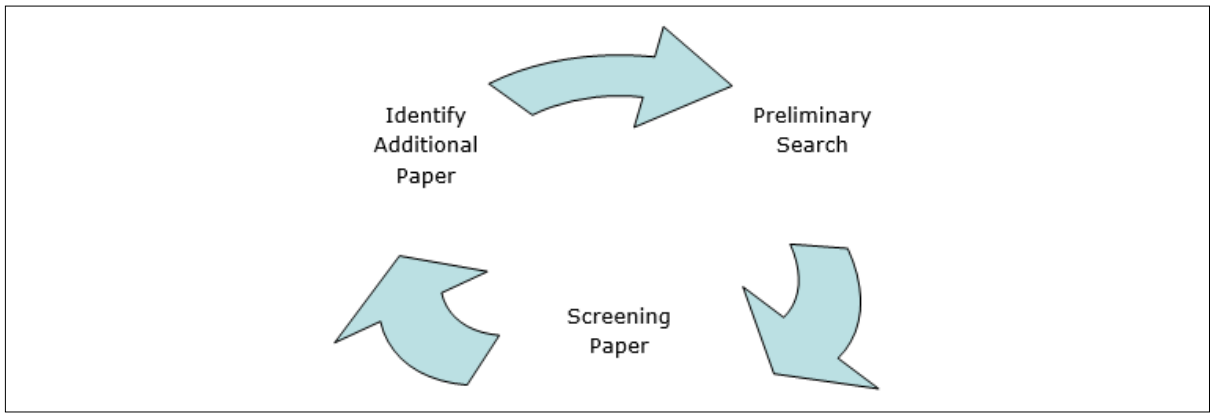


Figure 1. A systematic process flow of reviewing paper

For the preliminary search regarding the monitoring and detection method of LPG gas based on home, several relevant databases were used such as Google Scholar, IEEE Xplore, Research Gate, Academia and International Journal of Advances. The well-defined keyword was used for searching the related topics. The applicable searching term are used and can be categorized into two main parts which are basic concept of LPG gases and system for monitoring and detecting methods. For first part in identifying the basic concept of LPG, the searching term "liquefied petroleum gas (LPG)" was used. The searching terms "gas detection monitoring system", "LPG gas leakage detection", "smart alerting gas leakage detection", and "LPG detection system at home" was used in searching for second parts.

This keyword resulting a numerous of studies paper. The searching results are being screened in order to select the potentially related studied for further analysis. A journal paper was review by reading abstract before looking at the overall paper in order selecting a suitable and potential paper. The reference lists of the selected paper were examined to identify if any additional reference paper related the project are required. Lastly, the useful information is extracted and analyzed to fulfill the objective of research in this paper.

## RESULT AND DISCUSSION

Over a decade, several numbers of research were done by a researcher all over the world on the subject of monitoring and detecting gas leakage technique as a part of research paper and technical report. A Table 1 summarizes the previous studies of related topic. This literature's table is organized in terms of the controller used to regulate the system in detecting or monitoring gas leakage, the name of sensors used in detecting gas leaking, a platform or application used in monitoring the status level of LPG and electronic or mechanical devices used as a safety system in order to countermeasure the gas leaking. These methodological emphases include measures of detection gas detector performance with respect location of gas container located in current state, measure the performance of monitoring through several combination technology system and measures of mechanical of safety device performance.

Many works of literature in current state have given more attention to countermeasure the effect of gas leakage. In term of gas leakage detection performance measures, many previous studies conducted an experiment with respect to installed location; open areas and airtight areas (Hasibuan et al., 2019; Rahayu, 2020). Through the analysis tested, airtight area's ability has been proved to a most efficient way to test a gas leakage detector as time taken for a detector is faster compared to open areas. A gas leakage detector in open areas has been tested and it's come out less efficient performance due to several drawbacks such as a wind, volume areas, location of gas detector installed and so forth that must be considers.

In term of monitoring of gas leakage performance measures, several platform or application has been used and tested in monitoring the level volume of gas container and gas leaking as shown in Table 1 below. Based on summarization, the main technologies used mostly are Global System for Mobile Communications (GSM) and NodeMCU ESP 8266 boards or referred WiFi module or Internet of Thing (IOT) which equivalent of Ethernet. The GSM technologies supports outgoing and incoming voice call, simple message system (SMS) and data communication (via GPRS) via registered number of mobile phones which serves as an alerting the users if gas leaking occurs. As growing technology, the NodeMCU ESP 8266 has been introduced and became a popular choice compared to GSMs as one of its advantages can monitor the sensor data in real time from anywhere around the world with condition the present of internet and its can be control through mobile phone or computers. Based on table below, several applications such as Google Talk (Gtalk), Telegram, ThinkSpeak, Pushbullet API, notification through email, Blynk, android application using JAVA in Eclipse IDE, Virtual basic system via XBee PRO S2B module and others are employed. By using these approaches, the monitoring of gas leakage detector become more reliable and facilitate for users.

Further research is required on different approaches to providing a warning to users to reduce the number of gas accidents. However, one of the positive things about this is the researcher's awareness of developing gas leakage detection, monitoring and safety systems. This is reflected in the amount of research that has been conducted in this area. A comparative study based on previous research is shown in below Table 1.

Table 1. Summary of the gas leakage detection and monitoring system

| **Reference** | **Controller** | **Detecting System** | **Monitoring System** | **Safety System** |
|---|---|---|---|---|
| Ogwuche, C.A., Okorie, P.U. (2021) | Arduino Uno with ATMega 328 | MQ-2 gas sensor | SMS notification by GSM, Liquid crystal display (LCD) | Buzzer, LEDs, Exhaust fan, solenoid valve as the Emergency Shutdown (ESD) unit |
| Vishnu Priya, R., Kowsalya, G (2021) | Arduino Uno with ATMega 328 | MQ-2 gas sensor, LM 35 temperature sensor and PIR sensor | None | Buzzer, Liquid crystal display (LCD), solenoid valve as automatic turning off valves system, exhaust fan |
| Rahmalisa, U., Febriani, A., Irawan, Y. (2021) | Wemos D1 | MQ6 gas sensor | Wifi (ESP8266-01S) module using Telegram platform | Buzzer |
| Jayakumar, D., Ezhilmaran, R., Balaji, S., Kiruba, K. (2021) | Arduino Uno with ATMega 328 | MQ2 gas sensor | SMS notification by GSM, Liquid crystal display (LCD) | None |
| Vigneshkumar, R., Venkatesh, G., Sivasakthi, K. (2020) | Arduino Uno with ATMega 328 | MQ2, MQ5, MQ 8 gas sensor | Cloud Thinkspeak and PushBullet API by Wifi (ESP8266-01S) module, SMS notification by GSM | LED, Buzzer |
| Mani Kumar, CH.,Sumithabhashini, P., Sumanya, P.,Sravanthi, B., Susmitha, G., (2020) | Raspberry pi3 | MQ5 gas sensor | None | Alert message through Gmail and SMS, Buzzer, Audio Indication, LEDs, |
| Mahfuz, N., Karmokar, S., Rana, Md. (2020) | Arduino NodeMCU ESP8266 | MQ5,MQ6 gas sensor, Digital High Technology (DHT) 11 for temperature and humidity sensor | SMS notification by GSM, Web Server monitoring, Liquid crystal display (LCD) | Buzzer |

Table 1. Continued from previous page.

| **Reference** | **Controller** | **Detecting System** | **Monitoring System** | **Safety System** |
|---|---|---|---|---|
| Gupta, K., Krishna G, G., Anjali, T. (2020) | Arduino Uno with ATMega 328 | MQ135, MQ5, MQ6 gas sensor | Alert signal by Wifi module, Liquid crystal display (LCD) | Buzzer, Motor for controlling window operation |
| Rahayu, N. (2020) | Arduino Uno with ATMega 328 | MQ6 gas sensor | SMS notification by GSM, Liquid crystal display (LCD) | LED lights, Buzzer, Speaker |
| Athish Subramanian, M., Selvam, N., Rajkumar, S., Mahalakshmi, R., Ramprabhakar, J. (2020) | Arduino Uno with ATMega 328 | MQ5 gas sensor | ThingSpeak application and Pushbullet API by wifi module | LED light |
| Thanh Nguyen, B., Vu Nguyen, A. (2020) | Arduino Mega 2560 | MQ2 gas sensor | ThingSpeak platform by wifi module, SMS notification by GSM, Liquid crystal display (LCD) | Buzzer, LED light |
| F.Malbog, M., D.Grimaldo, H., Lolong Lacatan, L., (2020) | Arduino Mega | Flame sensor, MQ2 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Buzzer |
| Muthukumaran, N., Murugesh, S., Nishanth, S., Kumar M, P. (2020) | Arduino Uno with ATMega 328 | MQ2 gas sensor | Alert call by GSM module | LED lights, Automatic LPG regulator turning by DC Motor driver module, Buzzer |
| Kalaiselvi, M., Sulthana, N. (2020) | Arduino with ATmega8 | Strain gauge load sensor, MQ2, MQ6 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | None |
| Monirujjaman Khan, M. (2020) | Arduino Uno with ATMega 328 | MQ6 gas sensor | Liquid crystal display (LCD) | LED light, Buzzer |

Table 1. Continued from previous page

| **Reference** | **Controller** | **Detecting System** | **Monitoring System** | **Safety System** |
|---|---|---|---|---|
| Onyishi, D., Igbinoba, C. (2020)<br>Raut, P., Bondre, S., Motghare, V.,Kale, A., Girde, A. (2020)<br>Meshram, P., Mendhekar, S., Gadge, R., Shukla, N., Kanaskar, S. (2019). | Arduino Uno with ATMega 328 | MQ5 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Buzzer |
| Noorulhamitha,B.,Mahalakshmi, G.,Manisha, M., Gowsalyadevi, V.,Ganesan, R. (2020)<br>Theresa Mary J., D.,Sindhu, M., Bella Mary I., T., Paul, J. (2019) | Arduino Uno with ATMega 328 | MQ6 gas sensor, load cell | SMS notification by GSM module, Liquid crystal display (LCD) | Buzzer, solenoid valve |
| Zinnuraain, S. M., Hasan, M., Hakque, M. A., Arefin, M. M. N. (2019) | Arduino Mega 2560 | Strain gauge load cell, MQ2 gas sensor, DHT 22 temperature-humidity sensor | Blynk Mobile app through Wifi module, Liquid crystal display (LCD) | solenoid valve |
| Folorunso, C. O., Raheem, W. A., Akinyemi, L. A., Raji, A. A. (2019) | Arduino Mega | Force sensing resistor, MQ6 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Automatic turning valve by servo motor, buzzer, LED lights |
| Jamadagni, S., Chougule, N., Sankpal, P., Gurav, S., Patil, S. (2019) | Raspberry pi model 3 | Fire sensor, MQ2 gas sensor | SMS notification by GSM module | None |
| Suma, V., Shekar, R. R., Akshay, K. A., (2019)<br>Simbeye, D. S., (2017) | Arduino Uno with ATMega 328 | Load cell, MQ5 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Buzzer |

Table 1. Continued from previous page

| **Reference** | **Controller** | **Detecting System** | **Monitoring System** | **Safety System** |
|---|---|---|---|---|
| Tamizharasan, V.,Ravichandran, T., Sowndariya, M., Sandeep, R., & Saravanavel, K. (2019) | Arduino Uno with ATMega 328 | MQ6 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | None |
| Meshram, P., Shukla, N., Mendhekar, S., Gadge, R., Kanaskar, S. (2019) | Arduino Uno with ATMega 328 | MQ5 gas sensor | Sound and monitoring through social media via WiFi module | LED light, buzzer, exhaust fan |
| Ghosh, P., Dhar, P. K., (2019) | Arduino Uno with ATMega 328 | MQ9 gas sensor, flame sensor, smoke sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Solenoid valve at water inlet, buzzer, exhaust fan |
| Soh, Z. H. C., Abdullah, S. A. C., Shafie, M. A., Ibrahim, M. N., (2019) | Intel Edison Board | MQ2, MQ5 gas sensor | SMS and telegram notification to user handphone via Ubidots IoT Cloud platform | Buzzer, LED light |
| Sandeep, M., Nandini, C., (2019) | Arduino NodeMCU ESP8266 | IR sensor, strain gauge load sensor, MQ2 gas sensor, fire sensor, temperature sensor | SMS notification by GSM module, android application using JAVA in Eclipse IDE | Exhaust Fan |
| Adsule, A., Pratiksha, J., Deharekar, P., A.Patil, S., (2019) | Arduino NodeMCU ESP8266 | load sensor, MQ2 gas sensor | SMS notification by GSM module, Liquid crystal display (LCD) | Buzzer, exhaust fan, automatic regulator valve by solenoid, window |
| Sitan, T. S., Ab Ghafar, A. S., (2018) | Arduino NodeMCU ESP8266 | Load cell, MQ6 gas sensor | Notification email and Blynk app via Wifi module | LED lights, Buzzer |
| Abdul Hannan, M., Mohd Zain, A. S.,Salehuddin, F., Hazura, H., Idris, S. K., et al. (2018) | Arduino Mega 2560 | MQ2 gas sensor | Notification email and Blynk app via Wifi module, Liquid crystal display (LCD) | LED light, Buzzer, exhaust fan |

Table 1. Continued from previous page

| **Reference** | **Controller** | **Detecting System** | **Monitoring System** | **Safety System** |
|---|---|---|---|---|
| Dewi & Somantri, (2018) | Arduino Uno with ATMega 328 | MQ6 gas sensor | Liquid crystal display (LCD) | Buzzer, LED light, exhaust fan, automatic regulator valve by synchronous motor |
| Kusriyanto, M., Firdaus, Yulianto, A., Kurniawan, S. (2018) | Arduino with ATmega8 | MQ4 gas sensor | Virtual basic system via XBee PRO S2B module, SMS notification by Google Talk Application, Liquid crystal display (LCD) | None |
| Sonali, C., Kalyani, W., Shital, T., A.R. Kadu, P. (2018) | ARM Cortex M3 | MQ6 gas sensor | Liquid crystal display (LCD) | Buzzer, Exhaust fan, Automatic regulator valve by stepper motor |
| Santiputri, M., Tio, M. (2018) | Arduino NodeMCU ESP8266 | MQ2 gas sensor, fire sensor | Bar, alarm and SMS notification | LED light |
| Banik, A., Aich, B., Ghosh, S. (2018) | Arduino Uno with ATMega 328 | MQ5 gas sensor, temperature sensor | SMS notification by GSM module | LED light, exhaust fan, buzzer |
| Varma, A., Prabhakar, S., Jayavel, K. (2017) | Arduino Uno with ATMega 328 | MQ2 gas sensor, smoke sensor | Call notification by GSM module, ThingSpeak application and email by Ethernet Shield | Buzzer |
| Akshaya Priya, S., Jenifer, M., Keerthana, M., Prasanna Kumar, R. (2017) | ATMega89 | MQ6 gas sensor | SMS notification by GSM module | Buzzer, automatic control knob by stepper motor |
| Olubusola Olufunke NUGA, Kamoli Akinwale AMUSA, A. J. O., (2017) | PIC 16F877A | MQ2 gas sensor | SMS notification by GSM module | LED light, automatic control knob by stepper motor |

Nowadays, a simple tools or detectors are currently commercially available and are intended to be monitoring and detecting gas leaking. However, their efficiency in term of reliability, sensitivity, and safety systems is uncertain because systematic validation in term of sensitivity by varying distance was not taken into a consideration. Based on summarized of previous research, most of researcher come out with three main systems which are gas leakage, fire and smoke detection system, monitoring gas level system and safety system. It can be summarized that these three main systems are important to made system become more reliable and thus help to reduce or avoid any mishap cause by this subject.

Overall, the main concepts and approach methods used in this three mains system are mostly same but there are some additional applications or platforms have been used as the growth of technology. Based on our reviews, there are some weaknesses that needs to be improving in future work in order to make the system working more effectively, sensitivity and accuracy. The weaknesses of previous research are:

(1) The sensitivity of gas leakage detector is limited and consumes a longer period to operate if the possible gas sources are placed far especially in open, wide and large areas compared to ventilated and airtight room (Abdul Hannan et al., 2018; Hasibuan et al., 2019; Rahayu, 2020; Sitan & Ab Ghafar, 2018). Then other factors that influence mostly on results are the restriction of wind factors onto open areas, if the wind blows hard enough then the detected gas levels will decrease or not be detected. In contrast, a greater number of gas sensors should be deployed in detecting the leak gas with consider the volume area of the room in order to increase its detecting capabilities.

(2) The flame sensor is use in detecting a flame or light sources. Although its characteristic is high sensitivity, but the range and detection angle are limited to 180-degree view of the infrared LED and can sense the fire along its line of sight (Bondad et al., 2017; Kumar et al., 2019). Alternatively, the flame sensor can be installed at corner area or be increases a number of flame sensor installation with respect to the volume area of the room for a better coverage.

(3) Mostly the detector uses an AC power supply as the main source for the system to be operated (Adsule et al., 2019; Banik et al., 2018; Dewi & Somantri, 2018; Meshram, Mendhekar, et al., 2019; Meshram, Shukla, et al., 2019; Noorulhamitha et al., 2020; Varma et al., 2017). The system can be function well during normal condition, but the system will be interrupt and failure if blackout occurred. As the growth of technologies, this problem can be overcome by introducing a renewable source such as solar panel as the main power supply and integrate with the battery as power storage backup in order to ensure the continuous power supply.

(4) The main cause of gas leakage happen is on the main regulator valve. Based on the summarized of comparative study table above, it shows that most of researcher apply the GSM or IoT technique to inform the user if gas leaking occurs. The weakness for this system, the user still gets the message about the incident, but it fails to attempt turn off the valve if the resident is away from home (Vishnu Priya et al., 2021). Other than that, the user always needs to hold and be alert to their mobile phone and most importantly the phone must have internet coverage, and so forth. But this can be overcome by introducing and developing an automatic system to turn off the knob by using solenoid valve when gas leak detected (Abdul Hannan et al., 2018; Adekitan et al., 2018; Arpitha et al., 2018; Dewi & Somantri, 2018; Folorunso et al., 2019; Hosur et al. 2018; Muthukumaran et al., 2020; Noorulhamitha et al., 2020; Ogwuche & Okorie, 2021; Sitan & Ab Ghafar, 2018; Sonali et al., 2018; Theresa Mary et al., 2019; Zinnuraain et al., 2019). For a better efficient system, the use of exhaust fan can help drawn the leak gas to outside, automatic open the window as leaking gas that dissolve in air can move to outside, automatic off main power supply to off other electronic appliance in the house as

its one factor that can contribute to fire accident due to temperature increase and so forth can help to slower and overcome the problem.

Therefore, based on the critical review, learning the method of the monitoring, detecting gas leakage and safety system with high precision, real-time and strong inference is significantly important. One single form of parameter method is not sufficiently accurate to solve the gas leakage. As the growth of technology, combining the IOT and GSM system as a dominant data transmission and analytical capabilities can make a significant contribution to monitoring and gas leakage detection accuracy and real-time efficiency. In this section, the author demonstrates the data collected throughout the research. The data can be represented in table or graph however a concise explanation should accompany any embedded figure. If the figure contains any item which is subject to copyright protection, or that it may infringe individual privacy such as showing a recognizable face, then a granted permission needs to be presented.

## CONCLUSION

In the nutshell, the development of monitoring and detecting gas leaking and safety systems are crucially important to ensure the safety of home and its occupant as the biggest cause was a challenge in the gas cylinder itself. The combination of different sensing techniques has been used to ensure the sensitivity, efficient and high response time can be achieved in detecting a leaking gas performance. The combination of either MQ2, MQ5, MQ6, MQ8 and MQ 9 gas sensor with DHT11, DHT12 temperature and humidity sensor and flame sensor will make the detecting system became more reliable as several point of cause is detected. The integrated with the technologies such as SMS alerting and else by GSM, ThinkSpeaks, Blynk application by Wifi module as monitoring system and safety system which consist of electronic and mechanical device will make the incident that related to gas can be avoided. It can be seen that mostly previous research also introduces at least one component for every system in their works.

For future works, the gas leakage detector system can be implemented by introduced power supply from a solar panel with a battery as a backup power to provide continuous supply compared to use of AC power supply nowadays. A combination of MQ2 gas sensor, DHT22 temperature sensor, load sensor, smoke and flame sensor and PIR sensor are used in detection system. A number of sensors used must be calculated which consider the volume are of the room, location to be install and else. This system ensures if the gas leaking incident occur can be track more effectively and the occupant can be notified in advance whether in the vacant house or occupant's house. For monitoring system, the best recommendation by using WiFi module which allow the user to monitor the level of the gas in real time and automated direct control the safety device system if the unevaded incident occur. Lastly, the most critical and important part was safety device used. Author recommended to implemented tripper circuit which automated trip off the main switchboard (MSB) at risk stage, turned off the gas regulator valve by solenoid valve either the cause from mouth of cylinder or the hose, turning on exhaust fan to sucked gas to outside house, automate opening the window and alarm and voice buzzer to alert the user or people of surrounding if the incident occur. This monitors the gas and detection of its leakage system to provide the safety for human. More research and development are needed and tested before efficient gas leakage monitoring devices are commercializing in market.

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