

Literature Survey

TEAM ID: **PNT2022TMID52302**

PROJECT: Gas Leakage Monitoring & Alerting System for Industries

Design and Fabrication of a Carbon Dioxide Gas Leak Detection System for Oil and Gas Facilities:

The design and construction of a carbon dioxide gas leak detection system for oil and gas facilities were presented by **Chibuzor Amaobichukwu** (2021). This was created because a high carbon dioxide concentration can alter how well the respiratory system and central nervous system work. This led to the creation of this technology for detecting carbon dioxide gas leaks as a safety precaution to lessen this risk. This carbon dioxide gas leakage detection system was created using a MQ-135 sensor and an Arduino microcontroller with embedded C++ programming for a highly accurate and quick response system. In addition to being extremely accurate, gas leak detection is also affordable, portable, and useful for both household and commercial safety.

The Monitoring System of Leakage Accidents in Crude Oil Pipelines and LPG Gas Leakage Detection Using GSM Module:

In their articles "The Monitoring System of Leakage Accidents in Crude Oil Pipelines" and "LPG Gas Leakage Detection Using GSM Module" from 2022, **J. Ding, J. Wang, and Q. Pan** state that LPG is widely used throughout the world but also frequently causes accidents because of human error and gas leakage. In order to solve this issue, an effective safety system using four modules is created using IoT. The suggested model is divided into four components, including the Gas Detection Module (GDM), which constantly detects gas leaks to prevent unplanned incidents; The Notification Module (NM) is in charge of creating the message service to alert the user and the closest support centre; Location Detection Module (LDM) is in charge of tracking the gas leakage location and passing the value to NM; The Alarm Module (AM) is in charge of sounding an emergency alarm in the event of a gas leak. After the parameters were specified, the model correctly identified the gas leaks, and a warning was sent via the Wi-Fi network. To inform the receiver, the notification was forwarded to the server. In order to alert people of their existence and

dissuade any explosion and fire hazards, the warning (Buzzer) is immediately engaged. This smart system provides a number of safety benefits that are important for spotting gas leaks quickly and taking action to stop LPG leaks. If the pipeline's gas supply stops within a certain amount of time, there won't be any concern.

Internet of Things (IOT) Based Gas Leakage Monitoring and Alerting System with MQ-2 Sensor:

The Internet of Things (IOT)-based gas leakage monitoring and alerting system using MQ-2 sensor was shown by **Rohan Chandra Pandey, Manish Verma, Lumesh Kumar Sahu, and Saurabh Deshmukh (2017)**. Designing a dangerous gas detecting and alerting system using microcontrollers is the major goal of the effort. Hazardous gases including propane and LPG were detected, shown, and alerted every single second on the LCD display. When the typical level of these gases is exceeded, an alarm is immediately created, and an alert message (Email) is also sent to the appropriate person via the Internet and the ARM development board. By operating the Raspberry Pi 3 model attached with an embedded system with the necessary input and output gas levels with the aid of gas sensors, the operation of an IOT-based gas leakage and monitoring system was demonstrated. Because it is linked to a common web page designed to instantly alert or email the relevant authority, this makes operation more efficient and alleviates the strain of constant monitoring.

Low-Cost Gas Leak Detection and Surveillance System for Single Family Homes:

To prevent insecurity in Peru, **Ximena Perez-Palomino, Karina Rosas-Paredes, and Jose Esquicha-Tejada (2022)** presented a low-cost gas leakage and surveillance system that uses a Raspberry Pi 3, an Arduino board, a SIM 900 module, sensors, actuators, and peripherals to send emails to the corresponding housewives in the event of insecurity and a gas leak using voice command recognition. While systems like these are evaluated for satisfaction. As a result, this system is a wonderful solution for enhancing home security. The system is scalable and modular, therefore in order to increase functionality, it enables the addition of more sensors, actuators, and peripherals while accounting for electricity consumption to avoid overtaxing the Raspberry Pi or the Arduino board. Finding tiny gas pipeline breaches is a significant and ongoing issue for the oil and gas sector.

Gas Leakage with Auto Ventilation and Smart Management System:

Gas leakage with auto ventilation and smart management system using IoT were investigated by **AfsanaMim Anika, Ms. NasrinAkter, Md. Niamul Hasan, JanatulFerdousShoma, andAbdusSattarin** in 2021. This has arisen as a result of various problems or mishaps, mainly in metropolitan kitchens. Because most kitchens in urban areas are very small and lack a sufficient ventilation system. Gas spillage in this situation raises the chance of a fire accident, suffocation, or explosion. The suggested approach will contribute to increasing safety, lowering the mortality toll, and minimising harm to the environment. Auto ventilation and water flow via solenoid valve are two crucial components of the suggested system. The proposed approach is incredibly useful for preventing the death of fires.

Leak Detectionin Natural Gas Pipelines Using Intelligent Models:

According to **OluwatoyinAkinsete and Adebayo Oshingbesan's**researchfrom 2017, the market is starting to look into how tools like machine learning, artificial intelligence, big data, etc. can be used to enhance the processes used in the market today. According to the results, the Random Forest and Decision Tree models are the most sensitive because they can find a 0.1% leak in the nominal flow in roughly 2 hours. The findings indicate that more research can be done to see whether intelligent models are beneficial in finding leaks in natural gas pipelines with more intricate topologies. Finally, since intelligent models are data-driven, it is important to research how they might be applied to brand-new pipelines that have few or no operating data. Therefore, it is advised that more study be done in these areas.

Gas Leakage Detector and Monitoring System:

The monitoring system is based on a microcontroller that makes use of a gas sensor as well as a GSM module, an LCD display, and a buzzer, according to **Yekini N. Asafe, Akinade O. Abigael, and Oloyede A. Olamide** (2022). The system uses an Arduino microcontroller, a buzzer, and a MQ2 gas sensor to monitor gas leaks and send SMS notifications as necessary. Due to the embedded system that alerts people via several mobile phones for further action to be done when leakage is identified, this research endeavour increased our knowledge.The gadget uses a highly sensitive MQ-2 gas sensor to detect gas leaks and activate a buzzer to warn people of them. As a backup, the SIM800 GSM Module also sends an SMS with the message "Gas Leakage Detected" to notify the proper authorities or the facility owner of a gas leak.

Probabilistic Multiple Model Neural Network Based Leak Detection System:

The created multiple model NN leak detection system's probabilistic character, as proved by **Mohammad Burhan Abdulla and RandaHerzalla** (2015), allows decision-makers to assess the risks involved in their choices and, as a result, make more cautious ones. This is anticipated to further lower the false alarm rates, which will lower the needless shut down occurrences and lower the associated financial loss.

A Secured Model of Iot Based Smart Gas Detection and Automatic Alarm System:

Gas leakage is a significant issue in industrial production, departments, and living quarters, claim **MethilaFarzanaWoishe, Nila Sultana, Tamanna Zaman Bristy, NafizaAnjum Khan, and MD. TaimurAhad** (2022). Gas leakage detection kits should be installed in vulnerable places as one of the preventative measures against gas accidents. A wireless communication project called the gas leak detection and monitoring system was created to increase worker and equipment security in the petrochemical sector. In the industrial sector, extra crude oil is kept in small compartments. Therefore, the presence of outside sources that could lead to fire or overheating could result in catastrophic events. The refinery's gas itself contains risk. The Internet of Things (IoT) technology was used to create a Gas Leakage Detector and Smart Alerting methods for calling and texting the relevant authority as well as the capability to anticipate dangerous situations so that people can be made aware of them earlier through the appearance of information analytics at the sensor reading. This device for detecting gas is low-cost, low-power, portable, safe, user-friendly, effective, multi-featured, and easy to operate. Because gas leaks not only poison the atmosphere but also produce waste gases that harm our economy, a gas detector will not only give us important data for the health department but will also significantly boost our economy. The addition of a subsystem that can track gas waste and gas utilisation systems will be one of the system's key future capabilities. This system's shortcoming is that it can be used to monitor all subsystems, even those where gas is wasted and used. In water, our model is ineffective.

An Intelligent Gas Leak Detection System Using Iot:

An intelligent gas leak detection system was found by **Pankaj B. Thote, Mohammad Ashar, Christie Anil Joseph, Vishant G. Naik, and PriyaBambal** in 2021 utilising the internet of things. This created technique is the result of the fact that, when the leakage is discrete at times, no one can detect it. In these circumstances, a gas detection system is essential for monitoring the gas level continuously. The Node MCU and sensors in this system work together to address the problem. The main benefit of this intelligent system is that it provides exact leak detection and real-time response, giving more time for better and earlier prevention.

IOT Based LPG Gas Leakage Detector:

LoT Based LPG Gas Leakage Detector was demonstrated by **Prof.PranayMeshram, Nancy Shukla, StutiMendhekar, RenukaGadge, andShivaniKanaskar** in 2019. Gas leakage is a serious issue in the commercial and residential sectors, among other places. The system that will be suggested in this study can automatically identify, notify, and stop gas leaks. In particular, a gas sensor with great sensitivity to gases like propane and butane as well as LPG has been used. Once the LPG has been discovered, an alarm is set off. Leakage of LPG gas is detected by the MQ5 sensor. When the amount of LPG in the air exceeds the threshold, an LED light lights and a sound is made. Additionally, if the user is outside the audible range, an SMS is sent to the user's cell phone to alert them of the situation. The technology offers home safety and can be used to prevent fire accidents.

Internet ofThings (IOT) Based Gas Leakage Monitoring and Alerting System with MQ-2 Sensor:

Overall conclusion stated by **Rohan Chandra Pandey, Manish Verma, andLumesh Kumar Sahu**(2017) Since it was first imagined twenty years ago, IOT-based poisonous gas detectors and IOT technologies have advanced significantly. It has improved in terms of efficiency, usefulness for modern applications, and intelligence. This project's work focused on developing IOT technology to its highest potential. With the aid of this technology, the decision to use real-time gas leakage monitoring and measuring gas output levels has been plainly seen.

Design a FEARLESS on Gas Leak:

According to **LindraAuliaRachman, Hasbullah, UniversitasMercuBuana, KampusMenteng, Jakarta, Indonesia** (2022), during the development of a gas leakage detection system, the majority of gas detector equipment in the field suffered some damage, which prevented any gas leaks from being discovered. However, as gas detector detection system technology advanced, its capabilities could be expanded to detect and put out fires brought on by gas leaks. These considerations led to the development of the FEARLESS system, an automatic leak detection and fire extinguishing system (Fire Suppression and Smart Alert System). The FEARLESS system may determine a number of things, such as: It can lessen failures or damage that take place in order to lower the likelihood of undetected gas leaks. It can be paired with two or more detectors to meet a variety of needs. The likelihood of unidentified or unreported faults can be reduced by using this programme.

Gas Leakage Detection System with Alarming System:

The gas leakage detection system with warning mechanism was shown by **Muhammad Ahmad Baballe and Mukhtar Ibrahim Bello** in 2021. Using an exhaust fan to draw the gas away from the leaky area, this gadget can automatically detect, alarm about, and regulate gas leaks. The gadget is designed to be used in homes where the usage of natural gas or LPG-powered appliances and heaters may pose a concern. In this, mounting a gas leakage monitoring system in vulnerable spots is one of the preventative measures to stop accidents caused by this gas leaking. The exhaust fan will turn on when the MQ-5 sensor detects a gas, sounding an alarm and removing the gas from the surroundings. However, the main drawback is that a fire outbreak will be very difficult with the aid of the exhaust fan.

Gas Leakage Detection and Smart Alerting System Using Iot

Researchers ShitalImade, Priyanka Rajmanes, AishwaryaGavali, and Prof. V. N. Nayakwadi (2018) showed how IOT technology can be used to create a Gas Leakage Detector for society that has Smart Alerting techniques that involve text message sending to the relevant authority as well as the ability to perform data analytics on sensor readings. This will identify any dangerous gases in the air and notify all members of society through alarm and communication. Using gas sensors, this system will be able to identify any gases present in the surrounding area. This will shield us from the main detrimental issue.

Gas Leakage Detection and Alert System:

E. JebamalarLeavline, D.AsirAntony Gnana Singh, B. Abinaya, and H. Deepika (2017) demonstrated LPG gas leakage detection and alert system. Since it is extremely flammable, liquid petroleum gas (LPG) can burn even some distance away from the leak. A rubber tube of poor quality or a regulator that is not turned off while not in use are the two main causes of fire incidents. Therefore, creating a mechanism to alert of gas leaks is crucial. In order to identify gas leaks and inform everyone on board, this study provides a gas leakage alert system. To avoid accidents and preserve lives, it is crucial to identify LPG leaks. This paper presented LPG leakage detection and alert system. This system triggers LED and buzzer to alert people when LPG leakage is detected. This system is very simple yet reliable.

Iot Based Industrial Plant Safety Gas Leakage Detection System:

In 2018, **Yatish Krishna Yogi Borra, KusumaPriyaNimmanapalli, RNV Greeshma, and Ravi Kishore Kodali** showed an IOT-based industrial plant safety gas leakage detection system. Gas leaks are the primary cause of industrial fires. These have terrible effects on the environment, the machinery, and people's health, resulting in injuries and deaths. The available leakage detectors use on-site alarms to alert nearby residents. Therefore, this proposal suggests a leakage detector that delivers an SMS warning to the affected parties. The alerting system uses IFTTT to issue a notice after the sensing system finds the leak. The gas leakage detecting system prototype has been created and successfully tested with benzene, methane, and LPG. With very little delay, the alert message is successfully delivered to the mobile number.

Analysis of Iot Based Smart Gas Leakage Detector and Notification System:

MohdShahrillZuanMohd Zin (2021) and **ShanmukapriyaAmuthan** provided an explanation of the analysis of the IoT-based smart gas leakage detecting and notification system. This design suggests a cheap gadget that enables users to interact with their home's liquefied petroleum gas (LPG) using the Arduino Blynk software. Instead of using numerous switches, which is the main problem with other techniques, this uses a Wi-Fi module with a straightforward user interface. The three project objectives of creating a smart gas leak tracker with an appropriate microprocessor, constructing an intelligent gas leakage detector and calculating the best threshold value for gas leak detection based on data on gas concentration.

Sensor-Based Gas Leakage Detector System:

According to **Mohammad Monirujjaman Khan** (2020), system for detecting gas leaks based on sensors. This is due to the fact that Liquefied Petroleum Gas (LPG), which is cleaner than firewood and charcoal, is a major fuel source, particularly in metropolitan areas. Gas leaks are a serious issue in the industrial sector, in homes, etc. Due to an increase in gas leaks, home security has recently become a significant problem. In this study, a design for a gas leakage detection system that can automatically identify, notify, and manage gas leakage is proposed and discussed. In this study, a design for a sensor-based automatic gas leakage detector with a control and alarm system has been put forth. The proposed method will only cost USD 10, which even the poorest individuals may afford.

LPG Leakage Detection Using Gas Sensor (MQ-6):

The primary goal of the project, according to **N Evalina** and **H.A. Azis** (2022), is to construct a gas LPG leakage detector employing an LPG gas sensor and microprocessor. By offering an early Warning System to provide a sign if there is a gas smell around the home, it established a security system. The MQ-6 gas sensor is used to detect leakage of LPG gas and requires the presence of gas leakage signals on the sensors to function. When LPG gas is detected, the Atmega8 microcontroller measures the sensor output during this MQ-6 sensor test and then displays the results on the LCD screen. The ATmega8 microcontroller is used to measure the sensor output during this MQ-6 sensor test. When an LPG gas leak is discovered and the gas level reaches 2000 ppm, an automatic message is automatically displayed on the LCD screen and a buzzer sounds. However, it will immediately vanish from the LCD and the buzzer will cease playing when the gas levels are lowered to less than 2000 ppm. To ascertain the contribution of the MQ-6 sensor, this test was run.