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| **LITERATURE SURVEY** | | | | | | |
| **S.No** | **Title** | **Author’s Name** | **Publication**  **Year** | **Findings** | **Methodology** | **Pros /Cons** | |
| 1. | Internet of Things (IOT)  Based Gas Leakage  Monitoring and Alerting  System with MQ-2 Sensor | Rohan Chandra  Pandey,  Manish  Verma,  Lumesh  Kumar Sahu | 2017 | This paper choice of using a real time gas leakage monitoring andSensing the output levels of gas has been clearly observed by the help of this system. | MQ-2,  Raspberry pi | **Pros:**  1.It has become more efficient.  2. Quick response time  **Cons:**  High power consumation | |
| 2. | Gas Leakage Detection and Smart Alerting and Prediction Using IoT | Asmita Varma, Prabhakar S, Kayalvizhi Jayavel | 2017 | The proposed gas leakage detector is promising in the Field of safety. | Gas sensor,  ESP 8266,Buzzer | **Pros:**  It reduces the stress of constant monitoring.  **Cons:**  Installation cost can be high. | |
| 3. | Internet of Things (IoT) Based Gas Leakage Monitoring and Alerting System with MQ-6 Sensor | Rohan Chandra Pandey, Manish Verma, Lumesh Kumar Sahu,  Saurabh Deshmukh | 2018 | The main objective of the work is designing microcontroller based toxic gas detectingand alerting system. The hazardous gases like LPG and propane were sensed and displayed and notify each and every second in the LCD  display. | MQ-6 sensor,LCD display,  Microcontroller board | **Pros:**  Simplicity and its ability to warn about the leakage of the LPG gas.  **Cons:**  Gas may be leaked at various levels in various factories or homes, requiring additional gas sensors to detect it. | |
| 4. | IOT based industrial plant safety gas leakage detection system | Kodali,  Ravi Kishore | 2018 | Currentlyavailable leakage detectors warn the people around using on-site alarms. So, this project proposes a leakage detector which sends the warning to the concerned people through SMS. This detector senses the presence of harmful gases particularly, LPG, Methane and Benzene. | ESP-32 as a WiFi module , MQ6,  MQ4and MQ135 gas sensors, Buzzer | **Pros:**  1.Low cost  2. This detector senses the presence of harmful gases  **Cons:**  It measures toxic gases in very low concentrations. | |
| 5. | Smart gas level monitoring, booking & gas leakage detector over IoT. | Keshamoni, Kumar, and Sabbani Hemanth. | 2017 | The gasbookingorder is being done with the help IOT and that the continuous weight measurement is done using a load cell which is interfaced with a Microcontroller For ease it is even has a been added with an RF TX & Rx modules which will give the same information. When it comes it to security of the kit as well as gas container we have an MQ-2(gas sensor), LM 35(temperature sensor), which will detect the surrounding environment for any chance of error. | MQ-2,LM35 | **Pros:**  This is a low-cost, low power, lightweight, portable,  safe, user friendly, efficient, multi featured and simple system device for detecting gas.  **Cons:**  It measures toxic gases in very low concentrations. | |
| 6. | Gas Leakage Detection and Smart Alerting System using IoT | Shital Imade, Priyanka Rajmanes, Aishwarya Gavali , Prof. V. N. Nayakwadi | 2018 | Most of the societies have fire safety mechanism. But it can use after the fire exists. In order to have a control over such conditions we proposed system that uses sensors which is capable of detecting the gases such as LPG, CO2, CO and CH4. This system will not only able to detect the leakage of gas but also alerting through audible alarms | LPG, CO2, CO and CH4 | **Pros:**  Prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases in environment and hence nullify any major or minor hazard being caused due to them.  **Cons:**  It has ability to detect wide range of gases. | |
| 7. | IOT Based Gas Leakage Detection System with Database Logging, Prediction and Smart Alerting | Chaitali Bagwe, Vidya Ghadi, Vinayshri Naik, Neha Kunte | 2018 | The system provides constant monitoring and detection of gas leakage along with storage of data in database for predictions and analysis. The IOT components used helps in making the system much more cost effective in comparison with traditional Gas detector systems. | ESP-32 as a WiFi module , MQ6,  MQ4and MQ135 gas sensors, Buzzer | **Pros:**  Quick response time  **Cons:**  It measures toxic gases in very low concentrations . | |
| 8. | Gas Leakage Detection and Smart Alerting System Using IoT | Shital Imade, Priyanka Rajmanes, Aishwarya Gavali | 2018 | In this paper we use IOT technology for enhancing the existing safety standards. While making this prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases | NodeMCU , LPG Gas sensor Module ,Connecting wires ,Jumper Wires , Buzzer and Connecting wires | **Pros:**  It is very important for health and safety requirements monitor  continuously the gas leakage.  **Cons:**  User needs to check the LED lights for leakage. | |
| 9. | Gas Leakage Detection and Alert System using IoT | Sayali Joshi, Shital Munjal, Prof. Uma B. Karanje | 2019 | The aim of this paper is to introduce another framework  consequently books a cylinder at the point when the gas is going to discharge is by sending  a notice to the gas office using Wifi using Internet of Things approach In addition to that  sensor is utilized to identify gas spillage at home. | MQ5 sensor, Arduino module, GSM networks, Buzzer | **Pros:**  1.Simplicity and its ability to warn about the leakage of the LPG gas.  2.It off the regulator knob of the cylinder automatically when gas leakage detected.  **Cons:**  It is difficult to know failure modes unless very advanced methods of monitoring are used. | |
| 10. | LPG Gas Leakage Monitoring and Alert System using Arduino | Siddika, Ayesha, and Imam Hossain. | 2018 | The sensor will detect the gas leakage and transmit the information to the microcontroller | LPG sensor, Buzzer | **Pros:**  Even though if no one is there in the house and then gas leaks occurs, GSM module is there to send immediate messages to the stakeholders regarding the gas leak and thus it lowers the intensity of accidents  **Cons:**  Gas may be leaked at various levels in various factories or homes, requiring additional gas sensors to detect it. | |
| 11. | GSM-Based Gas Leakage Detection and Alert System | Nuga, Olubusola Olufunke, Kamoli Akinwale Amusa, and Ayorinde Joseph Olanipekun. | 2017 | The proposed system plays two roles in the event of gas leakage: alerting people about the leakage of gas by sending short message to the predefined telephone number and by closing of the cylinder head to prevent further leakage by using the stepper motor. The developed GSM-based gas leakage detection and alert systems is suitable for deployment in homes, laboratories and restaurants to check undesirable event of gas leakages and attendant risks. | MQ2 gas sensor, PIC microcontroller, GSM modem and a DC stepper motor | **Pros:**  The developed system will not only detect LPG leakage but go further to prevent further leakage if the cause of the leakage is due to accidental or deliberate opening of the head. Simultaneously, a short SMS is sent to a pre-defined phone number using GSM infrastructures to alert the concern people of the incident of gas leakage.  **Cons:**  High power consumption | |
| 12. | IOT Based Smart Gas leakage detection and Alerting System | Rohan, K. H. | 2016 | Gas leakages are causing massive explosions in places throughout the world.The conventionally available gas leakage detectors only have the provision to alarm the user who is physically present at the spot . Hence, to overcome this limitation, this project implements a model which sends an email to the user in case there is a leakage. This model detects the leakage of Liquid Petroleum Gas & Benzene. | Gas Sensor, Arduino-UNO, Thingspeak,  MQ-6,MQ-135, IOT | **Pros:**  It has become more efficient, more applicable to today’s applications and smarter . The choice of using a real time gas leakage monitoring and sensing the output levels of gas has been clearly observed by the help of this system.  **Cons:**  It has ability to detect wide range of gases. | |
| 13. | IoT based Gas Leakage Monitoring and Alerting  System | Pranay Meshram, Stuti Mendhekar, Renuka Gadge, Nancy Shukla, Shivani Kanaskar | 2019 | The proposed point goes for detection of gas  spillage and programmed controlling of the gas valve | Arduino Kit,Gas Sensor (MQ5),WI-FI Module | **Pros:**  To avoid any dangerous case that may happen  from the leakage of gas.  **Cons:**  It measures toxic gases in very low concentrations. | |
| 14. | Iot based home safety gas leakage  detection and automatic booking  system | Dr.Suma Christal Mary .S1  , Dr.Josphine Leela.R2  ,Dr.Vedhapriyavadhana.R 3  ,Dr.Ignisha Rajathi.G | 2021 | The aim of this paper is to introduce another framework  consequently books a cylinder at the point when the gas is going to discharge is by sending  a notice to the gas office using Wifi using Internet of Things approach In addition to that  sensor is utilized to identify gas spillage at home. | GSM module, gas sensor, PIR sensor, load cell, Arduino Uno,  Internet of things. | **Pros :**  Our system helps customers to upgrade their safety and protect life and property  from reputed accidents.  **Cons:**  Installation cost can be high. | |
| 15. | LPG Gas Leakage Detection using  IOT | Dr. Chetana Tukkoji  Mr. Sanjeev Kumar A. N | 2020 | This paper provides a brand new  approach to discover LPG discharge supported  microcontroller based Arduino. To alert on  Liquefied rock oil Gas (LPG) leakage and  preventing any unwanted incident, we need to  apply some cautions to discover the discharge | LPG Gas sensor Module, Buzzer, BC 547 Transistor | **Pros:**  Thus, LPG escape detection are useful to stop accidents  and to avoid wasting human lives  **Cons:**  It is difficult to know failure modes unless very advanced methods of monitoring are used. | |
| 16. | Sensor-Based Gas Leakage Detector System | Mohammad Monirujjaman Khan | 2020 | This  proposed system also includes an alerting system for the users. The system is based on a sensor that  easily detects a gas leakage | LPG (liquefied petroleum gas); gas sensor MQ-6; buzzer (alarm); LED (light) | **Pros:**  This is a low-cost, low power, lightweight, portable,  safe, user friendly, efficient, multi featured and simple system device for detecting gas.  **Cons:**  It is difficult to know failure modes unless very advanced methods of monitoring are used. | |
| 17. | LPG Gas Leakage Detector using Arduino | saddam | 2015 | Gas leakage occurs, this system detects it and makes an alert by buzing the buzzer attached with the circuit. | Arduino Pro Mini  LPG Gas sensor Module  Buzzer  BC 547 Transistor  16x2 LCD | **Pros:**  Fully Automated System.  If proper steps are taken instantly, it can save loss of life and property.  It can also be used to detect other poisonous gases.  **Cons :**  User needs to check the LED lights for leakage. | |
| 18. | Electronic design of liquefied petroleum gas leakage monitoring, alarm, and protection system based on discrete component | Attia, Hussain A., and Halah Y. | 2016 | The proposed electronic  system works on continuous detecting LPG gas leakage level  though suitable gas detector, then based on the electronic  design, a suitable actions of gas valve control signal and  sound alarm signal will be produced at happing state of the  gas leakage. | LPG Sensor, Buzzer and Microcontroller | **Pros :**  A high  performance gas leakage monitoring and protection systems  through either microcontroller units  **Cons :**  The high cost  and the complexity of these systems | |
| 19. | IoT Gas Leakage Detector and Warning Generator | Muhammad Tajammal Chughtai , Bader Farhan Alshammari | 2020 | This paper presents an industrial monitoring system design using the Internet of Things (IoT). The gas sensor (MQ-5) captured information is posted into a data cloud. The sensor detects the leakage of gas under most atmospheric conditions. | MQ5 Gas sensor and Buzzer | **Pros:**  The sensor detects the leakage of gas under most atmospheric conditions.  **Cons :**  It has ability to detect wide range of gases. | |
| 20. | LPG Gas Leakage Detection Using IOT | Arun Manhas  Neeraj Chambyal  Manish Raina  Dr. Simmi Dutta | 2021 | This technique triggers buzzer and displays the severity of the escape to alert individuals once LPG escape is detected. This technique is incredibly straightforward nevertheless reliable. | NodeMCU , LPG Gas sensor Module ,Connecting wires ,Jumper Wires , Buzzer and Connecting wires | **Pros:**  This technique is incredibly straight forward  **Cons:**  It measures toxic gases in very low concentrations. | |