

Gas Leakage Monitoring and Alerting System for Industries

PROJECT NAME	GAS LEAKAGE MONITORING & ALERTING SYSTEM FOR INDUSTRIES
TEAM ID	PNT2022TMID27112
TEAM MEMBERS	1. VIGNESH K 2. VARUN H 3. SHEWAG R 4. SREE RAGHAVENDRA R
BRANCH	ELECTRONICS AND COMMUNICATION ENGINEERING

Abstract:

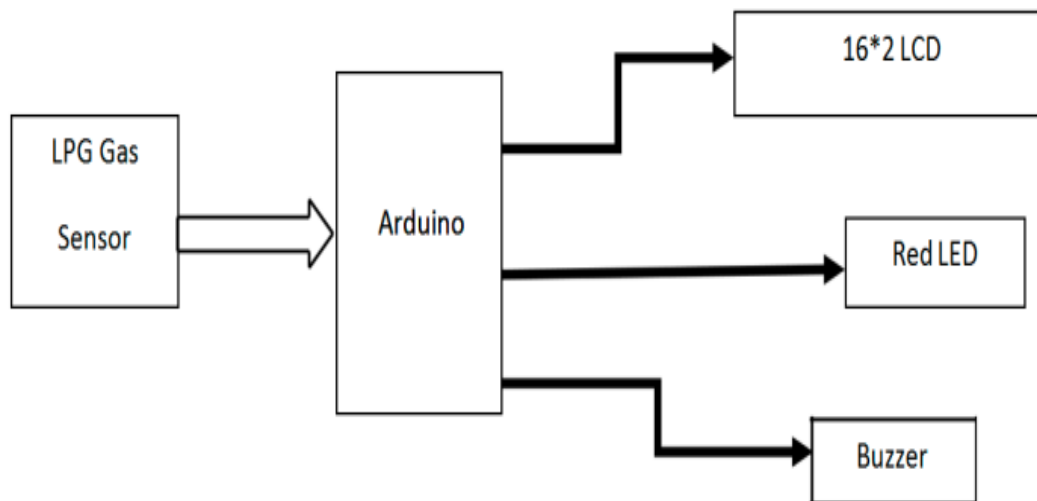
Gas leakage monitoring and tracking the toxic gas leakage detection in large-scale industries. By using advance technology Wireless Sensor Networks, we can avoid the hazards. Device and network will provide huge safety to environment around the industries and localize people. Power, energy consumption and structure with respect to their industrial boundary.

Introduction:

In the last decade, industrial hazard occur in regular interval. Due to the large amount of death, we need a precaution measure. By using the current technologies, we can prevent the hazards. These gases might toxic elements and flammable which is more dangerous. The Internet of Things have advance technology to solve these problems. Wireless sensing networks will provide accuracy about leakage around the industries. This mechanism is very efficient and reliable. It is capable of sensing gases such as CO, CO₂, LPG, and CH₄. These wireless sensor networks not only have detection and alarming systems inbuilt. The detection information also can be spread to people under the environment with alerting messages.

Objective:

The main objective of the proposed Gas Leakage Detection and Automatic Control System (GLDACS) is to provide a solution by designing an automatic system, which can detect the leakage of liquefied petroleum gas (LPG) at home and control it by turning off the cylinder knob. A gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage. A number of research papers have been published on gas leakage detection techniques.



IoT uses:

A mixture of propane and butane makes up the highly flammable liquid petroleum gas (LPG) chemical. LPG is used for cooking in restaurants, at home, and in industrial applications. They have a few flaws, which cause the gas to leak. Adjacent humans can only discover gas leaks; if no one is around, they cannot be found. However, occasionally a human with a poor sense of smell cannot notice it. As a result, this device will aid in detecting gas leaks.

Gas leaks can potentially start fires that harm human property and inflict catastrophic injuries or fatalities. IOT was used in the development of this system to provide users with real-time feedback and send notifications to users.

List of Components:-

S. No	Name of the Component	Quantity
1.	Arduino UNO R3	1
2.	Breadboard	1
3.	LED	2
4.	Resistor	5
5.	Piezo	1
6.	Gas Sensor	1
7.	LCD 16*2	1
8.	Potentiometer	1

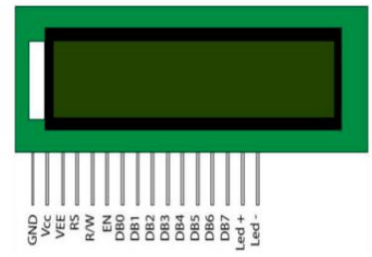
The required basic electronics components for designing a microcontroller based LPG leakage detector circuit mainly include Arduino Pro Mini, LPG gas sensor module, buzzer, BC 547 transistor, 16×2 LCD, 1K resistor, bread board, 9 volt battery and connecting wires.



Arduino Uno



MQ-6 Gas sensor



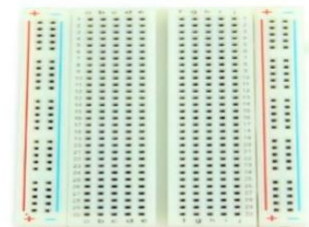
LCD Pin Configuration



Buzzer



16*2 LCD



Breadboard

Gas Sensors:

Electronic devices called gas sensors (sometimes referred to as gas detectors) are used to locate and classify various gases. They are frequently employed to gauge gas concentrations and identify explosive or dangerous gases. Gas sensors are used in manufacturing facilities and factories to find gas leaks and to detect smoke and carbon monoxide in residential buildings. Gas sensors come in a wide range of sizes (portable and fixed), sensing capabilities, and ranges. They frequently function as a component of a larger embedded system, such as security and hazmat systems, and are typically connected to an interface or audible alarm. Gas sensors require more frequent calibration than many other types of sensors since they are continually reacting with air and other gases.

Arduino Uno:

A microcontroller board called Arduino UNO is based on the ATmega328P. It contains 6 analogue inputs, a 16 MHz ceramic resonator, 14 digital input/output pins (six of which can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button. It comes with everything needed to support the microcontroller; to get started, just plug in a USB cable, an AC-to-DC adapter, or a battery. You can experiment with your UNO without being overly concerned that you will make a mistake; in the worst case, you can replace the chip for a few dollars and start over.

LCD:

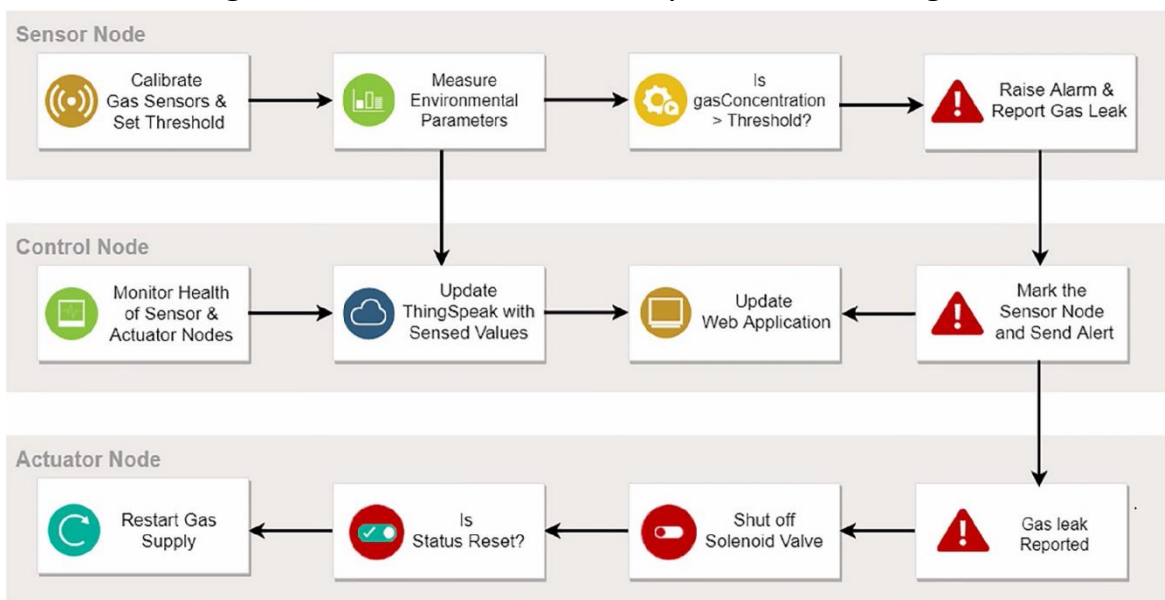
Liquid crystal display is referred to as LCD. It is a particular type of electronic display module used in a wide array of circuits and devices, including mobile phones, calculators, computers, TVs, and other electronics. These displays are mostly preferred for seven segments and multi-segment light-emitting diodes. The main advantages of adopting this module are its low cost, ease of programming, animations, and unlimited ability to display bespoke characters, unique animations, etc. The LCD device's inexpensive cost and low power consumption are two of its key benefits. So these LCDs run on AC power that has a frequency of less than 500 Hz.

BUZZER:

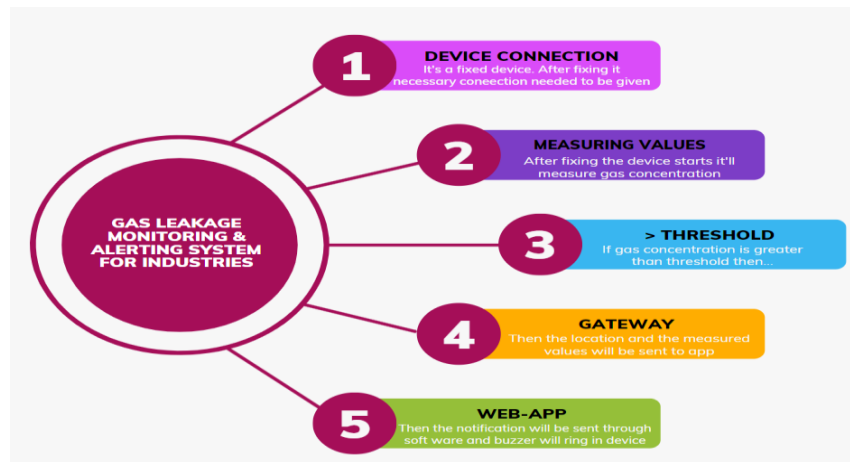
A beeper or buzzer, for example, could be electromechanical, piezoelectric, or mechanical in design. The signal is converted from audio to sound as its primary function. It is often powered by DC voltage and used in timers, alarm clocks, printers, computers, and other electronic devices. It can produce a variety of sounds, including alarm, music, bell, and siren, according on the varied designs.

Proposed Method:-

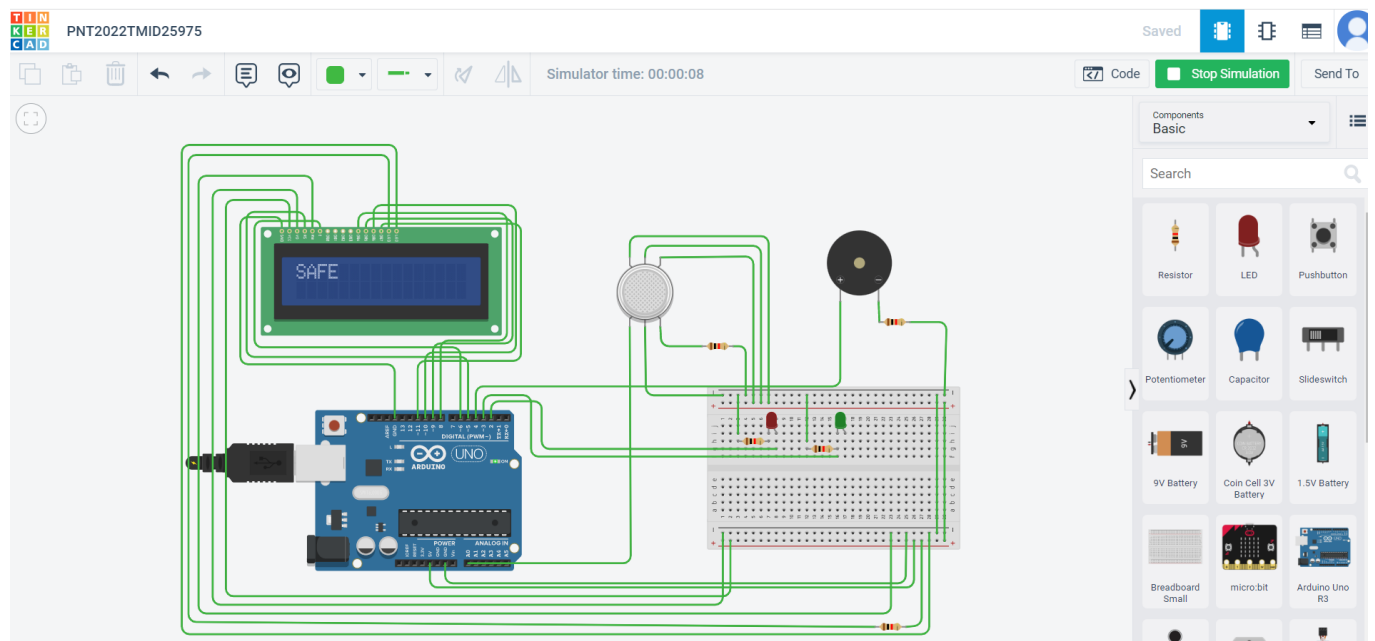
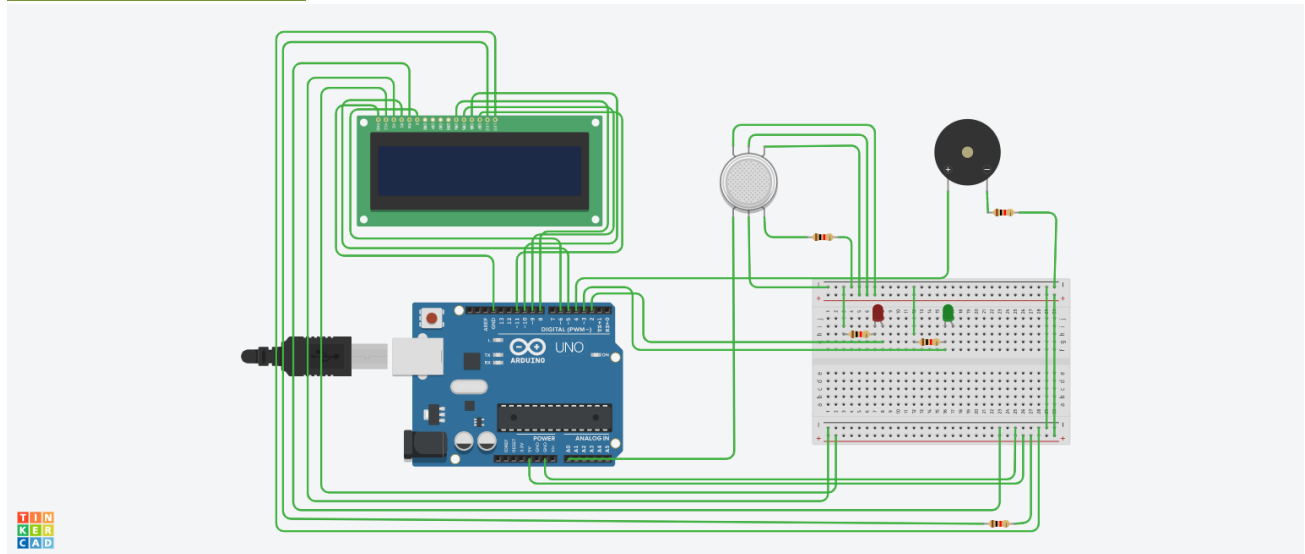
In this study, LPG gas is detected using semiconductor sensors. It makes use of a semiconductor sensor. The gas sensor's sensitive component is SnO_2 , which has a reduced conductivity in clean air. The sensor conductivity rises along with the rising gas concentration when the target flammable gas is present. The gas sensor responds to natural gas and has great sensitivity to propane, butane, and LPG. The sensor has a low cost and can be utilized for a variety of applications. It can be used to detect many flammable gases, including Methane. Anywhere between 200 and 10,000 ppm of gas, the sensor can detect concentration. The output of the sensor is an analogue resistance. The gas leak detection and alert system's block diagram.



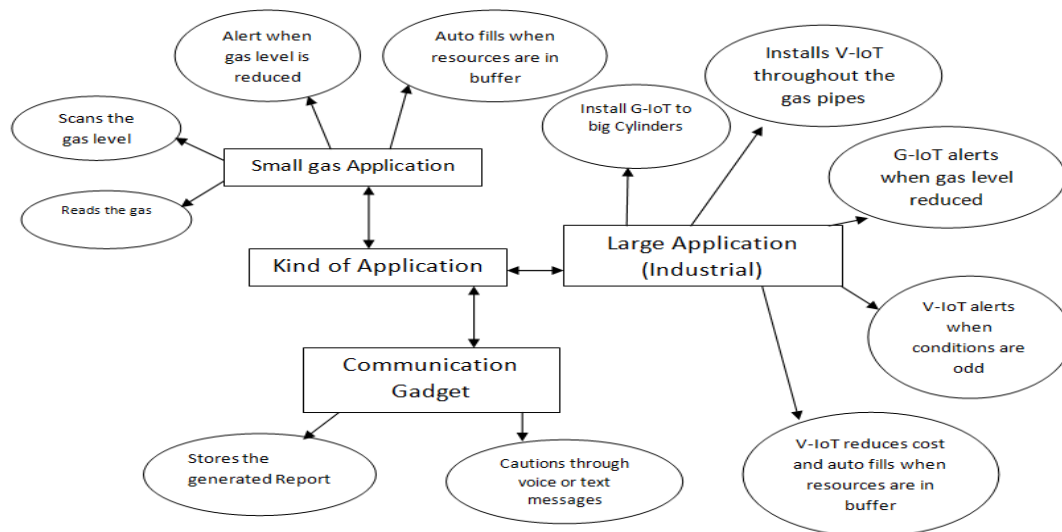
Arduino will use the sensor output as digital input. The buzzer will start to tune and the LCD will display "Gas detected: Yes" if the sensor output is high. The bell will not tune and the LCD will display "Gas detected: No" if the sensor output is low. The buzzer typically consists of a number of switches or sensors that are connected to a control unit that can identify which button was pressed or whether a predetermined amount of time has passed. The buzzer also typically illuminates a light on the appreciate button or control panel and emits a warning sound in the form of a continuous or sporadic buzzing or beeping sound.



Circuit Diagram:-



Solution Statement:-



The alarm, which includes a buzzer, will sound if the system detects a gas concentration in the air that is higher than the safety limit, alerting the users at home to the anomalous situation and enabling them to take any necessary action. The smell of gas in the house is the most obvious indicator of a leak. However, there are specific bodily symptoms that you might experience if there is a carbon monoxide leak. The output of this study is that the leakage will be found and terminated two seconds after it begins. The degree of gas leakage can even be detected by this technology. This is a powerful technique for automatically locating and stopping the gas leak.

Moreover, the fire incidents are also averted by cutting off the power supply. The concept of gas detection and control can be applied broadly across a range of industries. This system can be put in any room, including a restaurant in a hostel. This may help to lessen mishaps brought on by gas leakage in residential areas in addition to in comparable commercial settings. There are 180 million people living in our nation, and our product is affordable, will avoid many mishaps, and will protect countless homes, businesses, and lives.

Conclusion:

By this survey paper, IoT technology provides an advance sensing networks accuracy and reduced time alerting through internet with the physical parameter sensing devices. Harmful, toxic and flammable gases can be detected with their location in an industry. This system will able to identify the gases and prevent from their hazard. Secure life in a industrial environment.

References:

- abuprasanth.V. "Cloud Connected Smart Gas Leakage Detection And Safety Precaution System" International Journal of MC
- Square Scientific Research Vol.6, No.1 Nov 2014.
Asmita Varma, Prabhakar S, Kayalvizhi Jayavel. "Gas Leakage Detection and Smart Alerting and Prediction Using IoT."
- Internet of Things and Applications (IOTA), International Conference on.IEEE, 2017.
Kumar Keshamoni and Sabbani Hemanth. "Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT "International Advance Computing Conference IEEE, 2017.