

The following specification particularly describes the invention and the manner in which it is to be performed.

MONITORING LPG GAS LEVEL USING LOAD CELL SENSOR AND GAS LEAKAGE DETECTOR USING MQ2 SENSOR

Technical Field :

The technical field of monitoring LPG gas level using a load cell sensor and gas leakage detector using an MQ2 sensor falls under the domain of Internet of Things (IoT) and sensor technology.

Load cell sensors are devices that measure weight or force and are commonly used in industries such as food, pharmaceuticals, and transportation. In this case, the load cell sensor is used to measure the weight of the LPG gas cylinder to estimate the level of gas remaining inside it.

On the other hand, MQ2 sensors are gas sensors that can detect the presence of different gases such as LPG, propane, methane, and smoke. These sensors are commonly used in gas leakage detection systems to alert users of a potential gas leak.

The combination of load cell sensors and MQ2 sensors in an IoT-based gas monitoring system can provide accurate and real-time monitoring of gas levels and leakage. The system can be connected to a mobile application or web interface, allowing users to monitor the gas levels and receive alerts in case of a gas leak. This technology can be implemented in homes, commercial buildings, and industries to ensure safe handling and usage of LPG gas cylinders.

Existing problems :

There are several existing problems associated with monitoring LPG gas levels and detecting gas leakage, including:

- **Inaccurate readings:** Traditional gas level monitoring systems rely on pressure gauges, which may not provide accurate readings due to changes in temperature and pressure. Similarly, gas leakage detection systems based on visual inspection or smell detection may not be reliable and can miss detecting a gas leak.
- **Limited accessibility:** Gas level monitoring systems and gas leakage detectors are typically standalone devices that require physical access to the LPG cylinder or gas pipeline. This can make it difficult to monitor the gas levels or detect gas leaks in hard-to-reach areas or when the user is away from the location.
- **Lack of real-time monitoring:** Traditional gas monitoring systems may not provide real-time monitoring and alerts, which can delay detection of gas leaks or gas running out.
- **High maintenance:** Some gas monitoring systems require frequent maintenance, such as calibration or sensor replacement, which can be costly and time-consuming.
- **Limited connectivity:** Some gas monitoring systems may not be connected to a network, which can limit their ability to provide alerts or notifications to users.

Addressing these problems requires the development of more advanced and reliable gas monitoring systems that incorporate IoT and sensor technology to provide accurate and real-time gas level monitoring and gas leakage detection. Such systems should also be user-friendly, accessible, and require minimal maintenance.

Aim of the Invention

The aim of the invention of monitoring LPG gas level using load cell sensor and gas leakage is detected using MQ2 sensor which it is an based on IoT gas monitoring system that can accurately monitor gas level in LPG cylinders and detect gas leaks in real-time.

By using load cell sensors to measure the weight of the LPG gas cylinder and MQ2 sensors to detect gas leakage, the invention aims to provide an accurate, reliable, and cost-effective gas monitoring system that can be easily integrated into homes, commercial buildings, and industries.

The ultimate goal is to enhance the safety and efficiency of handling LPG gas cylinders and pipelines by providing users with real-time gas level monitoring and gas leak detection, which can prevent accidents, ensure the uninterrupted supply of gas, and reduce the risk of environmental pollution.

Background of the invention:

The background of the invention of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor can be traced back to the growing demand for safer and more efficient ways of handling LPG gas cylinders and pipelines.

Traditional gas monitoring systems based on pressure gauges or visual inspection may not provide accurate and reliable gas level monitoring or gas leak detection. This can result in accidents, environmental pollution, and disruptions to the supply of gas. Additionally, standalone gas monitoring systems may not be easily accessible or connected to a network, limiting their effectiveness.

To address these issues, IoT and sensor technology have been used to develop more advanced gas monitoring systems. By using load cell sensors to measure the weight of the LPG gas cylinder and MQ2 sensors to detect gas leakage, the invention provides an accurate, reliable, and cost-effective gas monitoring system that can be easily integrated into homes, commercial buildings, and industries.

The invention of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor aims to improve the safety and efficiency of handling LPG gas

cylinders and pipelines by providing users with real-time gas level monitoring and gas leak detection.

Objects of the invention :

Arduino UNO, SIM800L GSM Module, SIM card, Load cell sensor, LPG gas cylinder, MQ2 sensor, LCD display, Amplifier, connecting wires.

Summary of the Invention :

The project of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor involves the development of gas monitoring system based on Iot that which it can accurately monitor gas level in LPG cylinders and detect gas leaks in real-time.

The system includes load cell sensors to measure the weight of the LPG gas cylinder and MQ2 sensors to detect gas leakage. When the gas level in the cylinder reaches a threshold value or when gas leakage is detected, the system sends an SMS and a call alert to the user's mobile device, providing real-time notifications and alerts.

The project aims to enhance the safety and efficiency of handling LPG gas cylinders and pipelines by providing users with an accurate, reliable, and cost-effective gas monitoring system that can be easily integrated into homes, commercial buildings, and industries. The system allows users to monitor the gas level and detect gas leaks in real-time, which can prevent accidents, ensure the uninterrupted supply of gas, and reduce the risk of environmental pollution.

Overall, the project of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor provides an innovative and practical solution for gas monitoring that can improve the safety and efficiency of gas handling in various settings.

Here we use the load cell sensor to monitor the gas level in the cylinder. All the IoT components are controlled by an Arduino which acts as a central processor in the setup.

Gas monitor load cell sensor used Arduino which act as processor where it processes the input from the MQ2 sensor and GSM module for communication with the user by sending an alert through SMS and call. The advantage of Gas monitor is alert user for pre booking of the cylinder before it gets emptied.

Brief Description of the Drawings :

The device has load cell sensors that are positioned beneath the LPG gas cylinder to weigh it and gauge the gas level inside. By detecting the presence of LPG gas in the air, MQ2 sensors are also used to find gas leaks.

The system notifies the user's mobile device through SMS and call when the gas level in the cylinder reaches a threshold amount or when gas leakage is discovered, delivering real-time notifications and alarms.

The project seeks to provide customers with an accurate, dependable, and cost-effective gas monitoring system that can be readily incorporated into households, commercial buildings, and enterprises, improving the safety and efficacy of managing LPG gas cylinders and pipes. The system's real-time gas level monitoring and leak detection capabilities can help customers avoid mishaps, guarantee a steady supply of gas, and lower their risk of environmental damage.

Overall, the project's use of load cell sensors to measure LPG gas level and MQ2 sensors to identify gas leaks offers a creative and useful approach to gas monitoring that may enhance the security and effectiveness of gas handling in a variety of scenarios.

Detailed Description of the Invention :

The usage of LPG gas cylinder is world wider now-a-days. But in the gas cylinder there is no gas level indicator which tends to a major problem. In some urgent situations if the gas emptied the user wait till next day to order and delivery of the cylinder. So if the user regularly knows about the LPG gas level and gets an alert SMS when it reaches some minimum

value then it help the user to pre-order the LPG gas cylinder. For the monitoring of the LPG gas level we uses the load cell sensor which calculates weight of the cylinder and converts the mechanical signal into electrical signal and sends it to the Arduino UNO. The level of gas cylinder is monitored using the laptop whenever needed. When the gas level reaches the fixed threshold value then the GSM module will send an SMS and call alert to the end user.

The aim of our project is for developing LPG monitoring Gas level with Load cell sensor to regularly update the gas level.

- To build a system that can calculate the LPG Gas level in the cylinder.
- Detect the gas level when it reaches the fixed threshold value and triggers the alert system to alert the end user.
- To determine the level of gas in the cylinder and alert the concerned person via SMS and Call.

The main purpose of the monitoring the gas level is to automatically detect the gas level inside the cylinder. The intention of this project is to build a gas level monitor with load cell sensor using IoT. This sensor enabled solution helps monitor the LPG gas level regularly using the load cell sensor which calculates the weight of the cylinder and sends the mechanical signal to the Arduino. Whenever the gas level reaches the minimum threshold level it trigger the alert system to send a SMS and call to the user.

Installation of Arduino :

- Download Arduino IDE Software
- Power up the Arduino board.
- Launch Arduino IDE
- Create a new project. Select the Arduino board.

- Select the serial port and upload the program to the board.

Simulation of hardware :

- Connect the MQ2 gas sensor to the analog pin A3 in the Arduino.
- Connect the load cell sensor to the Arduino UNO board.
- The GSM module is connected to the Arduino to establish the communication.
- The LCD display is connected with the Arduino UNO board.

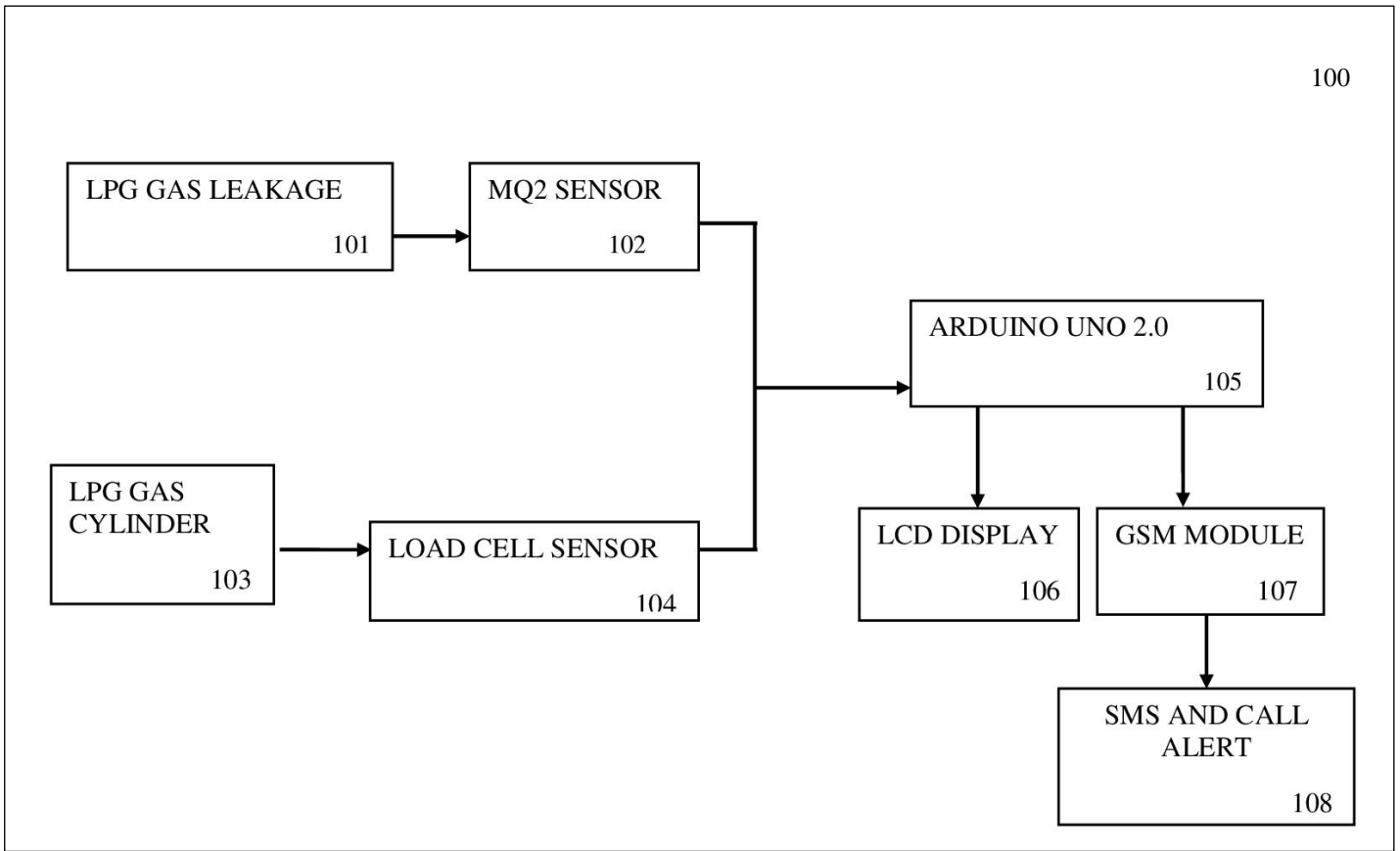
SMS Alert :

- GSM module is connected with Arduino using serial communication.
- SIM800 is a GSM module that works on the frequencies like 850 MHz, 900 MHz etc.
- This module provides all hardware's are interfaced with the module and the customer boards.
- This GSM module is low power consumption because it designed with power saving technique. If the gas leakage is detected, the system triggers the alert system to send an SMS to the particular mobile number using the GSM module.
- And also when the gas level in the cylinder reaches the minimum threshold value then it sends an SMS to the user.

Call Alert :

- SIM800 GSM module is used for the call alert.
- It is very useful for data transfer applications due to this module integrates TCP/IP protocol and extended TCP/IP AT command .
- The circuit mainly uses MQ2 sensor and Arduino to detect the gas leakage. If the gas is detected and also when the gas level in the cylinder reaches the minimum threshold value, it will trigger the alert system to send a Call to the particular mobile number using GSM module.

Block diagram LPG gas level and leakage monitor :



LPG GAS LEVEL AND LEAKAGE MONITOR

Load cell sensor :

A load cell is a type of sensor that is used to measure force, weight or pressure. It is designed to convert a physical force such as tension or compression into an electrical signal that can be measured and recorded. Load cells are commonly used in a wide range of applications, including weighing scales, industrial automation, and force testing equipment.

In the context of monitoring LPG gas level, load cells are used to measure the

weight of the LPG gas cylinder. The load cells are placed underneath the cylinder, and as the cylinder is filled with gas, its weight increases. The load cells measure this increase in weight and send a signal to the gas monitoring system, which then calculates the gas level inside the cylinder.

Load cells are a popular choice for gas monitoring systems because they are accurate, reliable, and can be easily integrated into various types of equipment. They are also durable and can stand with harsh environments.

MQ2 gas sensor :

MQ2 sensor is a gas sensor module that is capable of detecting a variety of gases, including LPG, propane, methane, and carbon monoxide. The sensor works by detecting the concentration of the gas in the air, and then producing an analog voltage output proportional to the gas concentration.

In this project of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor, MQ2 sensors are used to detect any gas leakage from the LPG cylinder. The MQ2 sensor is placed near the cylinder, and when it detects the presence of LPG gas in the air, it sends an analog voltage signal to the gas monitoring system, which then triggers an alert signal indicating the presence of gas leakage.

The gas monitoring system continuously monitors the MQ2 sensor readings, and when the concentration of LPG gas in the air exceeds a certain threshold, system sends the SMS and also call alert to user's mobile device, providing real-time notifications and alerts about the gas leakage.

MQ2 sensors are a popular choice for gas monitoring systems because they are low-cost, reliable, and can detect a wide range of gases. They are commonly used in gas leakage detection systems in homes, industries, and commercial buildings.

GSM:

A GSM stands for Global System for Mobile Communications module is a

hardware device that communication establish between mobile devices or computers and GSM network. It is commonly used to send and receive SMS messages, make and receive phone calls, and transmit data over a cellular network.

In this project of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor, a GSM module is used to send SMS alerts and call alerts to the user's mobile device in case of gas leakage or when the gas level in the cylinder reaches a certain threshold.

The gas monitoring system is connected to the GSM module, which enables it to send SMS and call alerts to the user's mobile device. The system is programmed to send alerts when the gas level in the cylinder reaches a certain threshold or By the using MQ2 sensor gas leakage is detected.

Usage of a GSM module in this project ensures that the user receives real-time notifications and alerts about the gas status, enabling them to take appropriate action to prevent accidents, such as turning off the gas supply and contacting the relevant authorities. Additionally, the GSM module allows for remote monitoring of the gas status, making it a convenient and efficient way of monitoring the gas level and detecting gas leaks.

LCD display :

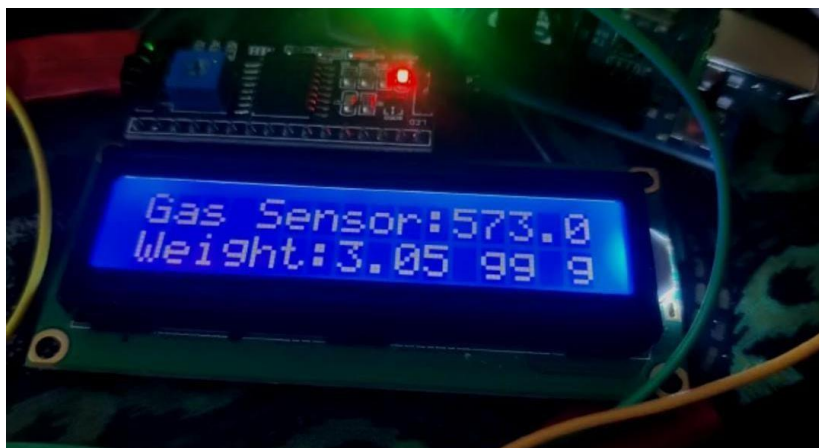
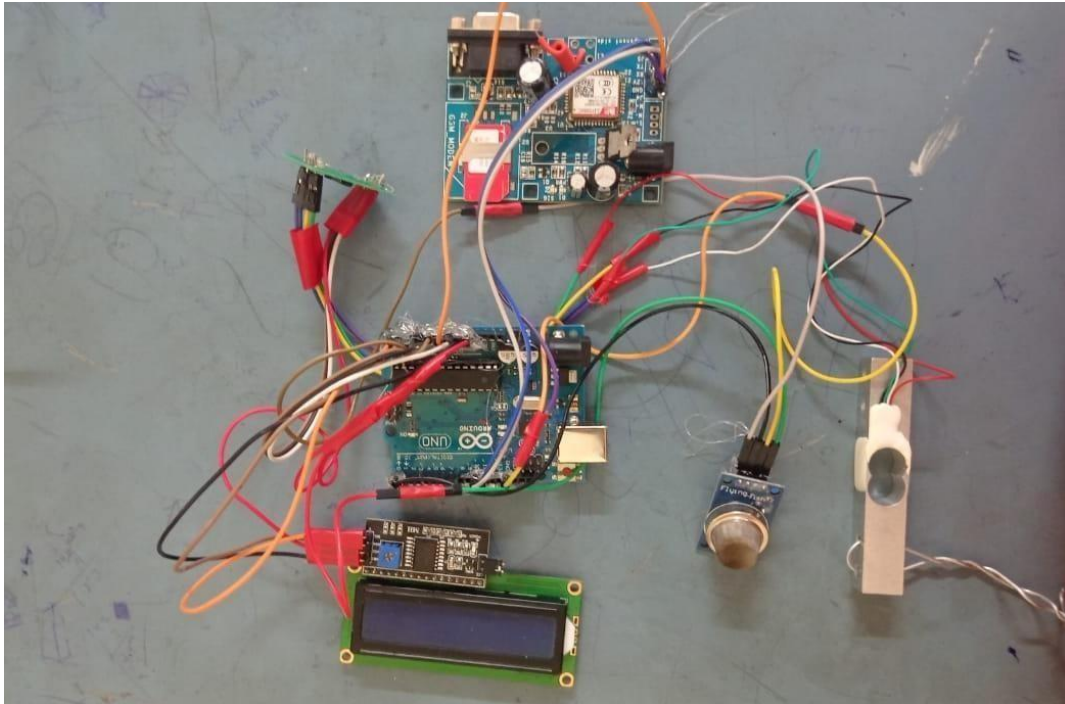
LCD (Liquid Crystal Display) is a type of electronic display that uses liquid crystals to display images and text. LCD displays are commonly used in a variety of electronic devices, such as calculators, digital watches, and computer screens.

In this project of monitoring LPG gas level using load cell sensor and gas leakage detector using MQ2 sensor, an LCD display is used to display the gas level in the cylinder and the status of the gas leakage detection system.

The gas monitoring system is connected to the LCD display, which displays the gas level in the cylinder in real-time. The LCD display also indicates the status of the gas leakage detection system, such as whether there is a gas leakage detected or not. This allows the user to easily monitor the gas status without the need for complex equipment or technical knowledge.

The LCD display is a convenient and efficient way of monitoring the gas status, providing real-time updates and allowing the user to take appropriate action in case of gas leakage or when the gas level reaches a certain threshold. Additionally, the LCD display ensures that the user is constantly aware of the gas status, helping to prevent accidents and ensure safety.

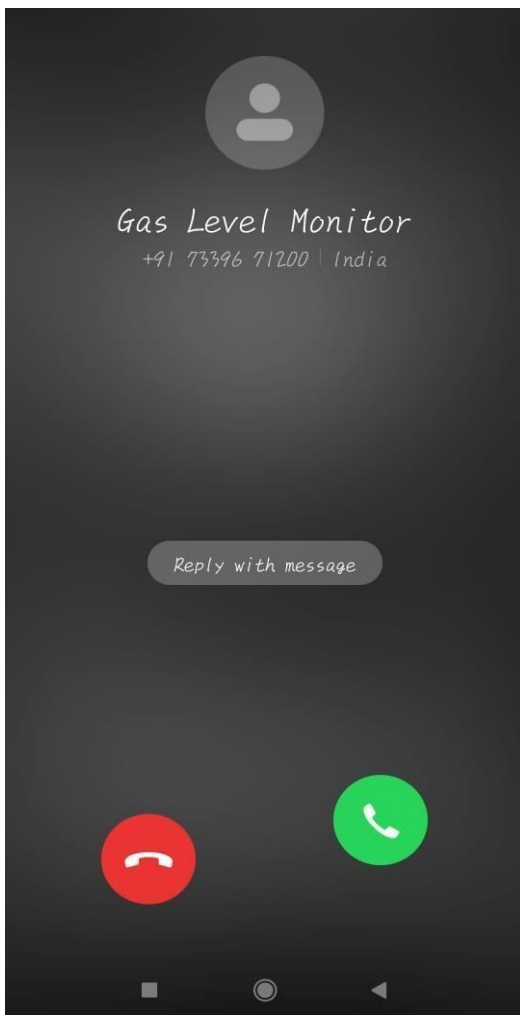
Implementation :



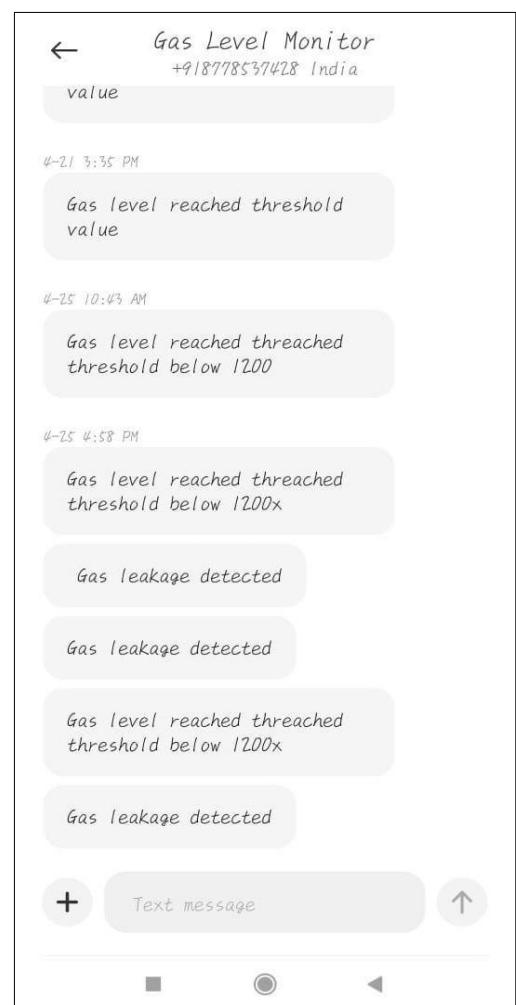
WEIGHT DISPLAY



GAS LEAKAGE ALERT



CALL ALERT



SMS ALERT