LPG Gas Variation Detection System

(Using MQ-4 Gas Sensor and Arduino with 16x2 LCD I2C)

Project Description

This project presents a gas leak detection and variation monitoring system using the **MQ-4 gas sensor**, an **Arduino Uno**, and a **16x2 LCD with I2C interface**. The system is specifically designed to detect **LPG gas concentrations** in the environment and is useful in kitchens, gas storage facilities, or pipelines to ensure **early detection of leaks**, **prevent accidents**, and **improve safety**.

It provides a real-time display of gas levels and can be further extended to trigger alarms or notifications when gas levels cross the safe threshold.

Components Used

- **Arduino Uno** – Main microcontroller board
- **MQ-4 Gas Sensor** – Detects LPG gas (also methane and other combustible gases)
- **16x2 LCD Display with I2C Module** – Displays gas concentration in ppm (parts per million)
- **Buzzer / Alarm** *(Optional)* – To alert when gas levels are high
- **Jumper Wires** – For wiring
- **Breadboard** – For assembling the circuit
- **5V USB Power Supply or Battery Pack** – To power the system

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Working Principle

- The **MQ-4 sensor** detects **LPG gas concentration** in the air and outputs an analog voltage proportional to the gas level.
- The **Arduino Uno** reads the analog signal and converts it into a digital value (ppm).
- The **LCD** displays the gas level in ppm in real-time.
- If the gas concentration exceeds a predefined threshold, the system can activate a **buzzer** to provide a warning.
- The data can be logged or transmitted using IoT modules like ESP8266 if extended.

Key Features

- Real-time monitoring of LPG gas concentration
- Early detection of gas leaks to avoid accidents
- Audible alert system integration (buzzer optional)
- Compact and low-cost design
- Easy to expand for IoT alerts or remote monitoring

Applications

- Home kitchens with LPG usage
- Commercial kitchens and gas outlets
- Industrial gas lines and pipelines
- Gas-powered vehicle workshops
- Warehouses and storage rooms

Power Supply Notes

- Arduino and MQ-4 sensor both operate at **5V**.
- System can be powered through **USB**, **battery pack**, or **external 5V adapter**.
- Ensure stable power for sensor calibration and accuracy.