MQ-5 Gas Sensor: What It Is and How It Works

What Is the MQ-5 Gas Sensor?

The **MQ-5** is a gas sensor that detects **Liquefied Petroleum Gas (LPG), natural gas (CNG), methane (CH_4), hydrogen (H_2), carbon monoxide (CO), and other combustible gases**. It is commonly used in **gas leak detection systems** in homes, industries, and safety applications.

The sensor provides both **analog (A0) and digital (D0) outputs**, allowing it to be used with microcontrollers like **Arduino, ESP32, and Raspberry Pi** for gas detection and alerting systems.

How Does the MQ-5 Gas Sensor Work?

The MQ-5 sensor operates using a **metal oxide semiconductor (MOS)** sensing element, specifically **tin dioxide (SnO_2)**, which is highly sensitive to combustible gases. The sensor works in the following steps:

1. **Gas Sensing Mechanism:**
    - The SnO_2 sensing layer has **high resistance in clean air**.
    - When **target gases (e.g., LPG, methane, or CO) are present**, they **reduce** the resistance of the sensor.
    - The change in resistance generates a corresponding **analog voltage output** that is read by a microcontroller.
2. **Heating Element for Sensitivity:**
    - The sensor contains a built-in **heating element** to maintain optimal sensing conditions.
    - The heater ensures the SnO_2 layer stays in an active state for gas detection.
3. **Outputs Available:**
    - **Analog Output (A0):** Provides a varying voltage based on gas concentration (useful for precise measurements).
    - **Digital Output (D0):** Provides a **HIGH** or **LOW** signal based on a set threshold (useful for simple gas detection alarms).

Gases Detected by MQ-5 Sensor

The MQ-5 sensor detects a variety of gases with different sensitivity levels:

Gas Detected	Sensitivity Level
LPG (Liquefied Petroleum Gas)	High
Methane (CH_4)	High
Natural Gas (CNG)	High
Hydrogen (H_2)	Medium
Carbon Monoxide (CO)	Low
Alcohol (Ethanol)	Low

Common Applications of the MQ-5 Sensor

- **LPG & Natural Gas Leak Detection** – Used in kitchens, gas stations, and pipelines.
- **Gas Safety Systems** – Integrated into security and fire alarm systems.
- **Industrial Gas Monitoring** – Used in chemical industries to prevent hazardous gas leaks.
- **Automotive Applications** – Used in vehicles powered by LPG or CNG for leak detection.

The **MQ-5** sensor is a crucial component in **gas safety systems** due to its high sensitivity to **LPG, methane, and natural gas**, making it ideal for **home and industrial safety monitoring**.

Basic Lesson – MQ-5 Gas Sensor

MQ5 Gas Sensor With Arduino

Automatic Gas Leakage Monitoring System Using MQ-5 Sensor

MQ-5 Combustible Gas Sensor Interfacing with Arduino

Using MQ5 Gas Sensor with Arduino