Gas Detector Sensor System

# Hardware Setup

The gas detection system uses an MQ-6 sensor connected to a microcontroller (ESP8266 or similar), integrated within a smart monitoring setup via Node-RED. The sensor continuously reads gas concentration in the surrounding air — particularly detecting gases like LPG, methane (CH₄), and alcohol vapors.

# 1. Sensor Data Collection

The MQ-6 sensor measures the concentration of gases by detecting changes in resistance when gas particles are present. This resistance (Rs) is compared to a calibrated clean-air baseline value (R₀). If Rs/R₀ drops below a threshold (indicating gas presence), it’s flagged as a gas leak.

# 2. Real-Time Processing and Alerts

Through Node-RED:  
- The analog reading is processed.  
- A switch node checks if gas is detected.  
- If true, it triggers visual/audio alerts (gauge widget turns red, notification pops up, optional sound plays).  
- If no gas is detected, the gauge stays in the green zone and no alert is triggered.

# 3. Visual Dashboard Monitoring

In your dashboard UI:  
- A gas gauge shows a real-time value (currently 0 units = safe).  
- Color zones (green, yellow, red) visually indicate gas levels.  
- It ensures quick recognition of dangerous levels even for non-technical users.

# 4. Simulation Integration

Simulated devices like the Polysense CO sensor and others support testing scenarios, showing how gas data updates propagate across the system and help trigger downstream alerts.

