



# **Green University of Bangladesh**

## **Dept. of Computer Science Engineering.**



**Course Title: Digital Logic Design Lab**  
**Course Code: CSE-204**

**Project: LPG Gass and Smoke Detection**

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**LPG Cylinder Explosion:**

Domestic LPG cylinders if not handled properly, can lead to disastrous and fatal consequences. It's almost impossible to have an LPG blast on its own without related factors. Firstly, a gas leak from the cylinder or regulator gets mixed with air, forming a combustible mixture. To complete the fire triangle we need a spark or a source of ignition. This spark ignites the combustible LPG-air mixture and this leads to an explosion. Such explosions normally take place during odd hours when people are not alert, like right after getting out of bed if one uses electrical appliances or uses a gas lighter.

Prevention is always better than Cure. It's imperative to follow safety measures while handling LPG cylinders. It's mostly negligent and careless handling that leads to cooking gas cylinder explosions. Embracing these effective safety measures will help in avoiding such accidents.



Don't put the cylinder in a hot water bath even if there is some residual LPG left as chances of a gas cylinder explosion are always on the rise when they are exposed to heat and fire.



Unknowingly keeping the gas knob in an open position. Remember to keep the regulator knob in the off position when not in use.



Do not store flammable and plastics in the kitchen near the LPG cylinder or cooking area.



Proper handling of electrical appliances.



ISI approved rubber tubes and regulators are to be used.

### **Equipment:**

- 1) Capacitor
- 2) Resistor
- 3) Sensor-2 nos
- 4) Cooling Fan
- 5) Lode
- 6) Power supply
- 7) Buzzer
- 8) LCD Display
- 9) Arduino for power supply

### **Circuit Working:**

A circuit diagram of the low-cost LPG smoke detector is shown. It is built around step-down transformer X1, two rectifier diodes 1N7805 (D1 and D2), a 1000 $\mu$ F capacitor (C1), 7805 voltage regulator (IC1), MQ-2 LPG gas sensor (GS1), dual comparator LM393 (IC2), Darlington transistor TIP122 (T2), 12V high-gain siren/buzzer (PZ1) and a few other components. The mains supply is stepped down by transformer X1, rectified by a full-wave rectifier comprising diodes D1 and D2, filtered by capacitor C1, and fed to regulator 7805 (IC1) to maintain constant 5V DC output, which is fed to the circuit.

At the heart of the circuit is dual comparator IC LM393 (IC2). It is used to compare two different voltages, namely, reference voltage and MQ-2 gas sensor output voltage.

The reference voltage at non-inverting pin 3 of IC2 is set using potmeter VR1 to adjust voltage levels based on sensitivity requirements. LPG sensor (MQ-6) output voltage is fed to inverting pin 2 of IC2.

If the reference voltage (pin 3 of IC2) is less than the sensor voltage (pin 2 of IC2), the output goes low, which means there is no LPG leakage. With low output, T1 remains cut off and there is no current flow through the buzzer; it does not sound and remains in silence mode.

If the reference voltage is greater than the sensor voltage, the output goes high, which means there is LPG leakage. The high output switches on transistor T1 and the buzzer rings loudly to alert the people around.

It is very easy to find gas leakages with this circuit, which uses low-cost components and an interactive way to adjust different sensitivity levels, based on customer needs, with the help of potmeter VR1.

### **Applications and Advantages:**

Applications of Microcontroller-based LPG Gas leakage system using MQ-2 sensor with Buzzer indication:

- 1) This project can be used in home and hotel utility (kitchen) areas for safety purposes
- 2) Useful in domestic LPG water heater
- 3) Very useful in LPG/CNG fitted cars to avoid measure accidents.
- 4) Prevent measure accidents in gas agencies (gas stations) where multi-cylinder are stored.