

# GAS AND FIRE DETECTION USING GSM TECHNOLOGY

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## ABSTRACT:

The Internet of Things aims to make life easier by automating every tiny action that we encounter. In addition to assisting in the automation of jobs, the benefits of IoT may also be used to improve existing safety standards. The most basic worry of any project, safety, has not been overlooked by IoT. Gas leaks, whether in open or enclosed spaces, can be harmful and deadly. Traditional Gas Leakage Detector Systems, despite their high precision, overlook a few issues in the realm of alerting. Traditional Gas Leakage Detector Systems, despite their high precision, overlook a few issues in the realm of alerting.

## INTRODUCTION

The Internet of Things (IoT) is a hot issue with significant technological, social, and economic implications.

Consumer items, durable goods, automobiles and trucks, industrial and utility components, sensors, and other ordinary things are being integrated with Internet connection and strong data analysis capabilities to alter the way we work, live, and play.

The impact of IoT on the Internet and economy has been estimated to be as high as 100 billion linked IoT devices and a worldwide economic impact of more than \$11 trillion by 2025, according to some estimates.

In the technology sector, policy circles, and engineering circles, the Internet of Things (IoT) is a hot issue.

This technology may be found in a variety of networked goods, systems, and sensors, all of which take use of advances in processing power, electronics downsizing, and network linkages to provide new capabilities. The widespread use of IoT devices has the potential to change many parts of our lives and energy management devices are moving us toward a vision of the "smart home", offering more about security and energy efficiency. IoT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of "smart cities", which help minimize congestion and energy consumption.

## PROBLEM DEFINITION

In this paper we are using MQ-6 semiconductor sensor to detect combustible gas. This gas sensor is made of SulphurNitroxide. This sensor has lower conductivity in fresh air. Then the output of this sensing element goes low. This low signal is monitored by the microcontroller and it will establish the gas outflow. Currently, the microcontroller turns on LED and Buzzer. Once few milliseconds delay, it conjointly activate fan for throwing gas out and continue send messages as "GAS LEAKAGE" to your mobile no.

The Iot aims to make life easier by automating every tiny action that we encounter.

### LITERATURE SURVEY

1. This concept provided a solution to the most common problem we face in our daily lives: a GAS container running out of gas.
2. Created this paper to raise awareness about the need of lowering the weight of gas in containers and to demonstrate how to place a gas order using IoT.
3. A alarm sounds whenever any of the sensors (load cell, LM35, Mq-2) undergoes a change.
4. When any of the sensors (load cell, LM35, Mq-2) undergoes a change, a siren will sound.
5. When a gas leak is detected by the MQ 2 sensor, which is made up of propane and butane, it sends a strong pulse to the Mc, which updates it in the IoT, and even a buzzer is sounded the issue may be worked out and resolved.
6. They propose a device to overcome the probable called the Gas Leak Detection device based on IoT (Internet of Things). It will monitor the content of flammable gas in the air, the presence of humans, and the presence of fire in the house continuously. With this device, it is expected that the number of future accidents can be reduced and will not cause major losses.
7. They suggest a Gas Gas Leakage detection Device based on IoT as a solution to the problem (Internet of Things).
8. It will continually monitor the presence of a person, the presence of combustible gas in the air, and the existence of fire in the house.
9. It is predicted that with this technology, the frequency of future incidents would be decreased and that substantial losses will be avoided.

### EXISTING SYSTEM

The microprocessor has been attached to the LCD, siren, and IOT module (ESP8266). In the IoT LPG leakage monitor

project, the ESP8266 chip is employed. This is a Wi-Fi module that allows microcontrollers to connect to a Wi-Fi network

and establish TCP/IP connections and transport data. These sensors capture data, which is then sent to the Web of Things.

The info is subsequently sent to a webpage using the IOT module When a gas leak is detected, the buzzer sounds and the

LCD displays the phrase "Leakage detected." The Wi-Fi module must be linked to a Wi-Fi zone or a hotspot before this

LPG gas leakage detection and smart alerting project can begin. This project may also be completed without the use of the

IoT module. We utilised a GSM module instead of the IOT module to produce the API key, which is activated by an SMS. In source code, the API key can be specified. We can link the Wi-Fi module to the think talks by providing an Username and password.

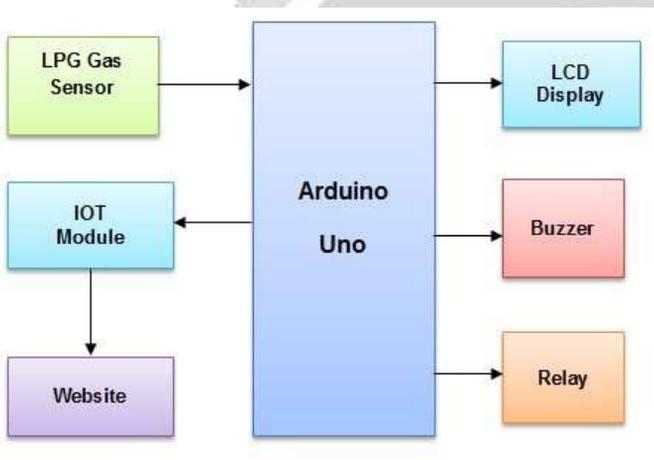
While LPG is a vital need of each social unit, its leak may result in a calamity, as stated in the scribed text (2013). There

are a variety of products available to detect LPG leaks and prevent any mishaps from occurring. We have created an associate degree Arduino-based LPG gas detector alarm in this project. If a gas leak occurs, this technology detects it and

generates a warning through a buzzer connected to the circuit. This approach is simple to construct, and anybody with a

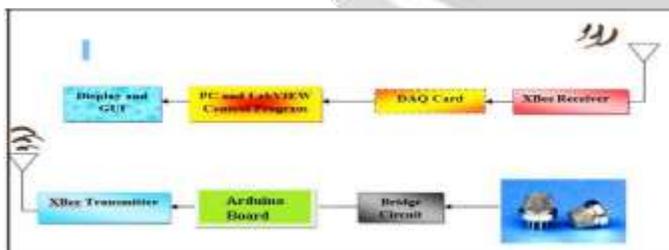
basic understanding of physics and programming may do it.

LPG gas is a commonplace item in daily life. But LPG gas is highly flammable. Many accidents have occurred as a result of LPG gas leaking. The cause might range from improper installation to the usage of faulty gas cylinders. This research tries to solve this problem by constructing a device that uses sensors coupled to a Node MCU. The equipment continually monitors the surrounding region. The gas sensor sends data to the Node MCU, which displays the results as a warning to the user on an Android-based smartphone. Aside from LPG gas, leaking gases from air conditioners and refrigerators are also dangerous in the house.. Using this device.



**System Architecture**

A block diagram of a proposed gas leakage is monitoring and control system given below.



Detectors and a communications networks allow data to be sent to a server in this system.

Sensor nodes sense data on their own, and the data link is used to send it to the gateway, which then sends it to a sensor network.

The hardware part of the system consists of:

1. The sensing system
2. Arduino Board
3. XBee

Arduino is a device that acts similar to a perfect microcontroller unit and has some special features with high performance ability. It offers an open-source electronic prototype platform with simple and flexible access and easy use of hardware and software. The sensing circuit system consists of a liquefied petroleum gas (LPG) sensor, (MQ-2) that detects the presence of a specified gas in the surrounding area and XBee transfers the sensor data read from Arduino port to a computer in a wireless mode.

### COMPONENT REQUIRED

1. Arduino Pro Mini
2. LPG Gas sensor Module
3. Buzzer
4. BC 547 Transistor
5. 16x2 LCD
6. Bread board
7. 9 volts battery
8. Connecting wires

### ARDUINO UNO

The Arduino Board provides designers, artists, designers, amateurs, and anyone else who tinkers with technology with a low-cost, easy-to-use technology to form inventive, multimedia applications, and platform supported Arduino boards that plugged into Conjointly output - activating a motor, turning on Associate in Nursing photodiode, or business enterprise one thing online, we will indeed be training our board what to attempt to by causing a collection of direction

Beginners will find the Arduino software system simple to use, while expert users will find it flexible.



### Lpg Gas Sensor Module (MQ6)

Specialists have detailed the many components of LPG architecture on YouTube. On the basis of label sensitivity, the sensing element can detect various types of flammable gases. This sensing element might be labelled by misusing the potentiometer on the breakout board for the MQ6 gas sensor element. Associate degree analogue

output is provided by the sensor element. The MQ-6 can detect gas concentrations ranging from 200 to 10,000 parts per million. Associate degree analogue resistance is the sensor's output. The sensing element module is connected to the host microcontroller through a 4-pin board compatible Stp header, which requires one i/o pin from the host microcontroller. When the accompanying microcontroller is powered up, it initiates an initial heating interval and so activates the LPG detecting element output.

It will tell the Host controller by pulling the output pin to high and starting to flash aboard diode if the LPG concentration is higher than the specified value.

The sensing element module is designed to create a technique of inspecting LPG supplies while also having the ability to set an alarm limit if the source gets too much.



The MQ6 (LPG Gas Sensor) is a simple-to-use liquefied petroleum gas (LPG) sensor. It can be used in gas leakage detecting equipment in consumer and industry applications, this sensor is suitable for detecting LPG, iso-butane, propane, LNG. Avoid the noise of alcohol, cooking fumes and cigarette smoke.

#### **BUZZER**

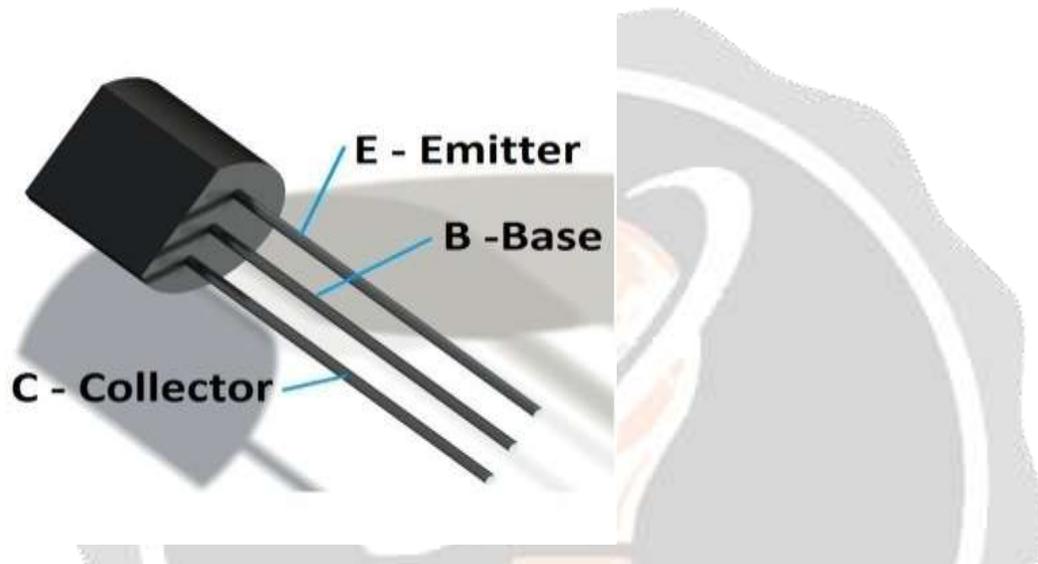
A buzzer, often known as a pager, is an aural signalling device that can be mechanical, electrical, or both (Piezo for short). There are two pins in it. Its simple structure and inexpensive cost make it suitable for a wide range of applications, including car/truck reversing indicators, computers, and decision bells. It is also true that when mechanical pressure is applied to certain materials, electricity is generated, and the opposite is also true. Piezoelectric materials can be found in nature or created artificially. Piezo ceramic is a type of man-made substance that has a Piezo electrical impact and is commonly used to make the disc, which is at the heart of a Piezo buzzer. They stretch or compress in line with the frequency of the signal after being exposed.



When a voltage is supplied between the two electrodes, the ferroelectric material deforms mechanically as a result of the voltage.

### BC 547 Transistor

When asked the type of triode BC547 belongs to, we believe it is a standard NPN (Negative-Positive-Negative) junction transistor. And his bc547 parameter as well as the bc547 pin diagram are crucial in understanding BC547. I'll go through the BC547 electrical component in more detail below. It is a BJT transistor that is frequently utilised to meet the need for fast switching. If you're working on an engineering project with this transistor, I recommend downloading BC547 Proteus Simulation. Simulating before accessing the hardware, as we all know, is always a superior method. So, let's take a look at BC547's fundamental knowledge.



Current amplifiers, rapid switching, and pulse-width modulation are all common applications for BC547 (PWM). As a result, if you need to control the speed of a motor or actuator in one of your projects, this transistor will suffice. Because the BC547 is an NPN transistor, when the base pin is held at ground, the collector and emitter are left open (reverse biassed), and when a signal is applied to the base pin, the collector and emitter are closed (forward biassed).

### 16x2 LCD

It's a Digital Display, in which liquid is used to create a visible image, and each character is made up of 5x8 picture element dots. The operating voltage ranges from 4.7 to 5.3 volts. Without the illumination, the current consumption is 1mA. It shows alphabets and numerals here. It is made up of two rows, each of which prints 15 characters in a 5x8 pixel box. Green and Blue Backlight are used to print the characters. A 16x2 LCD display is a relatively basic module that can be found in a variety of devices and circuits. A 16x2 LCD can display 16 characters per line on each of its two lines. Each character is presented in a 5x7 pixel matrix on this LCD.



### Microcontroller

This powerful (200 nanosecond coaching execution) but smooth-to-application (simplest 35 unmarried phrase instructions) CMOS FLASH-primarily based eight-bit microcontroller packs Microchip's powerful %® structure into an forty- or 44-pin bundle and is upwards well matched with the PIC16C5X, PIC12CXXX and PIC16C7X gadgets.



A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.

### GSM

The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991. By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories.

GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world.

### Relay

We have used a 12-volt relay in this system. Arduino can not turn on a 12-volt relay so we have used a relay driver circuit to turn on this relay. We can control any AC or DC device with the help of this Relay.



### ADVANTAGES

1. Phototransistors produce a higher current than photo diodes.

2. Phototransistors are relatively inexpensive, simple, and small enough to fit several of them onto a single integrated computer chip.
3. Phototransistors are very fast and are capable of providing nearly instantaneous output.
4. Phototransistors produce a voltage, that photo-resistors cannot do so.
5. Get real-time alerts about the gaseous presence in the atmosphere.
6. Real-time updates about leakages.
7. Get immediate gas leak alerts.
8. Measure oxygen level accuracy.

#### **DISADVANTAGE**

- 1.No prevention of fires possible with kit.
2. It works only when at 5V power supply is given.
3. Its sensitivity depends on humidity and temperature.
4. It is a little sensitive to smoke.

#### **FUTURE SCOPE**

- 1.This project can be implemented using Arduino Uno. Arduino & GSM based LPG Leakage detector reduces circuit since Arduino has inbuilt ADC.
2. We can provide voice feedback system.

#### **GSM/GPRS Module**

GSM/GPRS module is used to establish communication between a computer and a GSMGPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc.) for computer. The MODEM is the soul of such modules.

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