

## **ABSTRACT**

The presence of dangerous LPG leakage in the cars, service station or in the storage tank environment can be detected using the Ideal Gas Sensor. This LPG gas leakage detector unit can be easily integrated into a unit that can sound an alarm or give a visual suggestion of the LPG concentration.

The output of the sensor goes LOW as soon as the LPG sensor senses any gas leakage from the storage. This is detected by the microcontroller and the LED & buzzer is turned ON. After the delay of few milliseconds, the exhaust fan is also turned ON for throwing the gas out and it continues sending message as 'GAS LEAKAGE' to a mobile number which is pre-defined.

## **Chapter -1**

### **INTRODUCTION**

#### **1.1 Background**

In human's daily life, environment gives the most significant impact to their health issues. Therefore, environment and industry air quality issues are critically discussed to increase the awareness and responsibility regarding the threat on the environment towards public and workers health. Most of the dangerous gas such as carbon monoxide (CO), refrigerant gas and liquefied petroleum gas (LPG) are colorless and odorless compound that are produced by incomplete combustion. Therefore, gas detector device is needed in order to inform the safety situation continuously. Carbon monoxide (CO), often referred to as a "silent killer" is an injurious gas and its prolonged exposure to living beings can lead to brain damage and even death. The harmfulness of CO is dependent on both, the concentration of the gas and the exposure time. Thus, a small concentration of the CO when exposed for a long period of time can be fatal just like a large concentration of the CO for a small period of time. Fires are the most common source of CO [1]. In smaller quantities (e.g. 100 ppm) it may cause a headache and dizziness after a couple of hours of exposure. Higher concentrations (example 3200 ppm) may causes headaches and dizziness after 5–10 min, and death within 30 min. Very high concentrations (e.g. 12800 ppm) causes unconsciousness after a couple of breaths, followed by death in less than 3 min. [2] The indoor

dangerous sources are the leak source of CO, CO<sub>2</sub> and CH<sub>4</sub>, which may be gas tank or the fire site. The essential component of coal gas or nature gas is CO or alkanes gas. The burning of chemical materials or decorative materials will emanate CO, CO<sub>2</sub> and alkanes gas. The danger of these gases arising is from two aspects, one is the toxicity of these gases themselves, the other side is that the accumulation of these gases will easy be ignited. The position of gas tank or pipeline is usually fixed, so it is easy to inspect, yet the fire site is random, and it will be difficult for inspection. [ 3] The danger of the CO gas is the same as the LPG and others dangerous gas in the environment. Gas detector is a gas detecting device. It only can detect if there is a gas leakage or the leaking concentration.

This is what is running situation in our day to day life, a thought of finding some solution to this problem come up with this idea of giving the alert about gas leakage as soon as possible. So, a thought from taking responsibility of society came our project “MICROCONTROLLER BASED GASLEAKAGE ALERT SYSTEM VIA SMS”.

## **1.2 Aim of the project**

- 1.To analyze gas sensor in detecting the LPG smoke and alcohol
- 2.To design gas control system that shows the indicator alarm and blow the buzzer.
- 3.To develop a system that can automatically alert via SMS

## **1.3 Methodology**

The purpose of this project is to develop alarm system for gas detector. The gas sensor used in this project is MQ5 which detect the present of smoke alcohol and Liquefied Petroleum Gas (LPG). These sensor will detect the concentration of the gas according the voltage output of the sensor. To make the sensors operate in the alarm system and data monitoring system, Arduino Uno was used as the microcontroller for the whole system. The circuit also includes LED GSM and buzzer.GSM will send the alert as SMS from gas sensor to a remote mobile.

## **1.4 Significance of this work**

This project is very useful in day to day life and adds extra safety, Use of this project makes your remote place secure from GAS Leakage by taking proper action when we get alert.

## **1.5 Outline of this report**

This report contains a detailed information about all the components used in this project. The components used are:

- Arduino UNO
- Gas sensor
- GSM module
- Buzzer
- LED

A detailed report about each and every component is described in separate chapter wise.

## **1.6 Conclusion**

I have finally succeeded in making the “MICROCONTROLLER BASED GAS LEAKAGE ALERT SYSTEM VIA SMS” Satisfactorily. More knowledge is gained and more experiences are faced lot of information's are collected ultimately, I have concluded with a great pleasure for achieving our aim

.I have planned to fulfill my technical requirements. The knowledge I have attained with this project really would follow till the end of our career.

This system is built to help user to feel comfortable in a work place and easy to monitor the range of air quality in the environment from remote location. This system device also gives an advantage to the user to easily get the information about the air quality in their building or industrial area by monitoring the system.

## Chapter 2

### ARDUINO(Uno)

#### 2.1 Overview

The Arduino Uno is a microcontroller board based on the Arduino uno. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

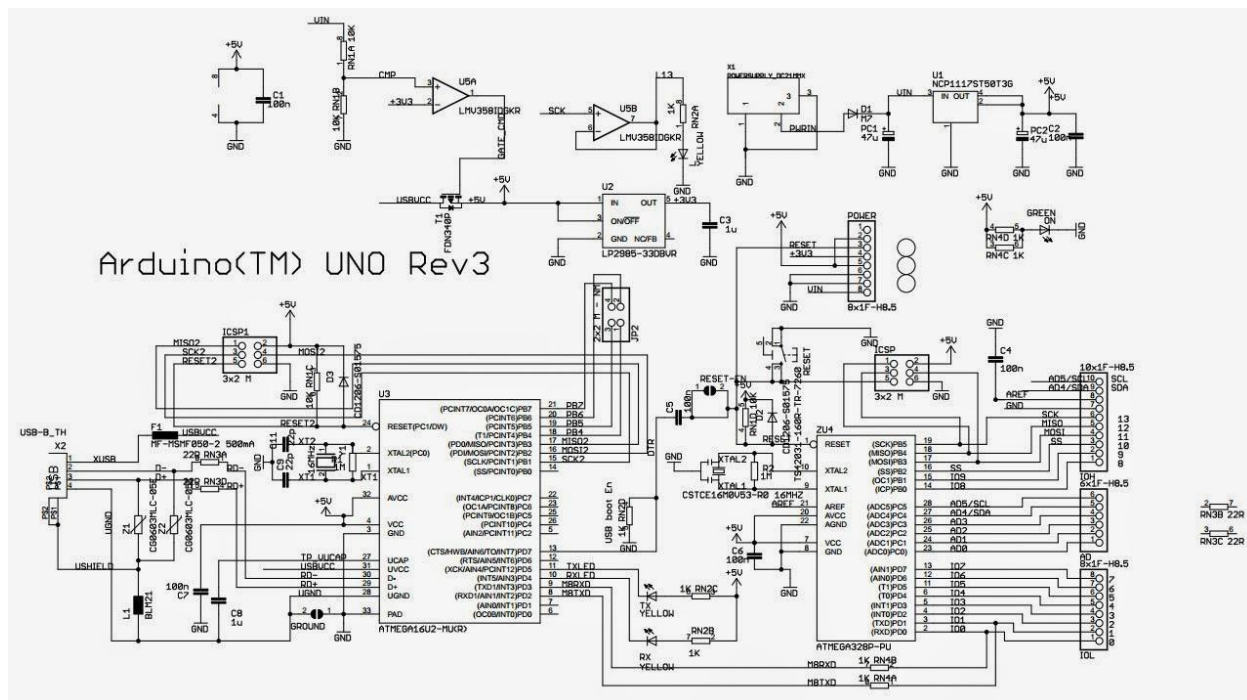
The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 3 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Atmega 16U2 replace the 8U2.
- "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0.

The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.

## 2.2 Schematic & Reference Design



## 2.3 Summary

Microcontroller	Arduino uno
Operating Voltage	5V
Input Voltage	7-12V
(recommended)	
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)

Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (Arduino uno) of which 0.5 KB used by bootloader
SRAM	2 KB (Arduino uno)
EEPROM	1 KB (Arduino uno)
Clock Speed	16 MHz

## 2.4 Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- **VIN**: The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V**: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- **3V3**: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50mA.
- **GND**: Ground pins.

- **IOREF:** This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V.

## 2.5 Memory

The Arduino uno has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

## 2.6 Input and Output

Each of the 14 digital pins on the Uno can be used as an input or output, using `pinMode()`, `digitalWrite()`, and `digitalRead()` functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial:** 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- **External Interrupts:** 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the `attachInterrupt()` function for details.
- **PWM:** 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the `analogWrite()` function.
- **SPI:** 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- **LED:** 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though it is possible to change the upper end of their range using the AREF pin and the `analogReference()` function. Additionally, some pins have specialized functionality:
- **TWI:** A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.
- There are a couple of other pins on the board:
- **AREF:** Reference voltage for the analog inputs. Used with `analogReference()`.
- **Reset:** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

## 2.7 Communication

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The Arduino uno provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver

is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A Software Serial library allows for serial communication on any of the Uno's digital pins. The Arduino Uno also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

## 2.8 Programming

The Arduino Uno can be programmed with the Arduino software. The Arduino Uno on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).

You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details.

The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.
- You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader). See this user-contributed tutorial for more information.

## 2.9 Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the Arduino Uno via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-



second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data. The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to reenable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line.

## **2.10 USB Overcurrent Protection**

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

## **2.11 Physical Characteristics**

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

## **CHAPTER-3**

### **GAS SENSOR(MQ-5 SENSOR)**

#### **3.1 Overview**

LPG Gas Sensor Module is designed to detect the presence of a dangerous LPG leak in your Home, car or in a service station, storage tank environment by interfacing with Microcontroller without ADC Channels and programming. In this version of LPG Gas sensor module two pots are included, one for trigger level setting and the other for setting sensitivity of the sensor. It allows to determine when a preset LPG gas level has been reached or exceeded. The module uses MQ-6 sensor to sense LPG leak. The MQ-6 can detect gas concentrations anywhere from 200 to 10000 ppm.

Interfacing with the sensor module is done through a 4-pin breadboard compatible SIP header and requires One I/O pin from the host microcontroller. The onboard microcontroller provide initial heating interval after power-up and then starts to measure LPG sensor output. If it found the LPG concentration above preset value , it will inform the Host controller by pulling the Output Pin to High and Starts to blink a onboard status LED. The sensor module is mainly intended to provide a means of comparing LPG sources and being able to set an alarm limit when the source becomes excessive.

The best location to fix Gas Sensor Module is near the Gas Cylinder or near the pipeline in case of piped gas connection. In case of LPG, when Gas leakage occurs , the gas will settle down near the floor because LPG is heavier than the air. So for best results it would be advisable to fit Gas Sensor Module nearly 1m above the floor.

MQ-5



### 3.2 APPLICATIONS

- They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of
- LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

### 3.3 FEATURES

- Uses the MQ-6 LPG Gas Sensor
- Easy SIP interface
- Compatible with most microcontrollers
- Analog Sensor voltage is available at ANG pin.
- Onboard Status and Power LED
- Onboard Pot for threshold setting
- Onboard Pot for Sensitivity setting
- On board microcontroller

### 3.5 Performance specifications

#### 1. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
V <sub>c</sub>	Circuit voltage	5V±0.1	AC OR DC
V <sub>H</sub>	Heating voltage	5V±0.1	AC OR DC
P <sub>L</sub>	Load resistance	20K Ω	
R <sub>H</sub>	Heater resistance	33 Ω ± 5%	Room Tem
P <sub>H</sub>	Heating consumption	less than 750mw	

#### 2. Environment condition

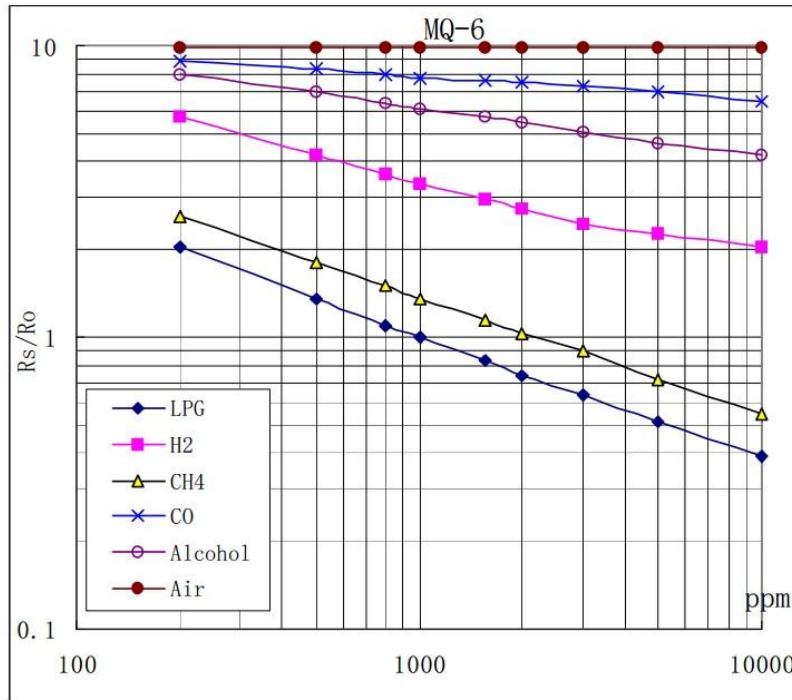
Symbol	Parameter name	Technical condition	Remarks
T <sub>ao</sub>	Using Tem	-10°C-50°C	
T <sub>as</sub>	Storage Tem	-20°C-70°C	
R <sub>H</sub>	Related humidity	less than 95%Rh	
O <sub>2</sub>	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

#### 3. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
Rs	Sensing Resistance	10K Ω - 60K Ω (1000ppm LPG )	Detecting concentration scope: 200-10000ppm LPG , iso-butane, propane, LNG
α (1000ppm/ 4000ppm LPG)	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20℃ ± 2℃ Humidity: 65%±5%	Vc:5V±0.1 Vh: 5V±0.1	
Preheat time	Over 24 hour		

### 3.6 Functional description

A sensor composed by micro AL<sub>2</sub>O<sub>3</sub> ceramic tube, Tin Dioxide (SnO<sub>2</sub>) sensitive layer , measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.



sensitivity characteristics of the MQ-6 for several gases.

in their: Temp: 20°C、

Humidity: 65%、

O<sub>2</sub> concentration 21%

RL=20k Ω

Ro: sensor resistance at 1000ppm of LPG in the clean air.

Rs:sensor resistance at various concentrations of gases.

## CHAPTER -4

### GSM MODULE(SIM 900 A)

#### 4.1 Overview

GSM/GPRS TTL –Modem is built with SIMCOM Make SIM900 Quad-band GSM/GPRS engine, works on frequencies 850 MHz, 900 MHz, 1800 MHz and 1900 MHz. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3/5V TTL interfacing circuitry, which allows you to directly interface to 5V microcontrollers (PIC, Arduino, AVR) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, ect). The baud rate can be configurable from 9600-115200 through AT command. Initially Modem is in Autobaud mode. This GSM/GPRS TTL Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS as well as DATA transfer application in M2M interface.

The modem needed only two wires (Tx,Rx) except Power supply to interface with microcontroller/Host. The built in Low Dropout Linear voltage regulator allows you to connect wide range of unregulated power supply (4.2V -13V). Yes, 5 V is in between !! .Using this modem, you will be able to send& Read SMS, connect to internet via GPRS through simple AT commands.

## 4.2 Features

- High Quality Product (Not hobby grade)
- Quad-Band GSM/GPRS 850/ 900/ 1800/ 1900 MHz
- 3V3 or 5V interface for direct communication with MCU kit
- Configurable baud rate
- SMA connector with GSM L Type Antenna.
- Built in SIM Card holder.
- Built in Network Status LED
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- Audio interface Connector
- Most Status & Controlling Pins are available at Connector
- Normal operation temperature: -20 °C to +55 °C
- Input Voltage: 5V-12V DC

## 4.3 Specifications

- Quad-Band 850/ 900/ 1800/ 1900 MHz
- GPRS multi-slot class 10/8
- GPRS mobile station class B
- Compliant to GSM phase 2/2+
  - Class 4 (2 W @ 850/ 900 MHz)
  - Class 1 (1 W @ 1800/1900MHz)
- Dimensions: 24\*24\*3mm
- Weight: 3.4g
- Control via AT commands (GSM 07.0707.05 and SIMCOM enhanced ATCommands)
- Low power consumption: 1.0mA(sleep mode)
- Operation temperature: -40°C to +85 °C\

### Specifications for Data

- GPRS class 10: max. 85.6 kbps (downlink)

- PBCCH support
- Coding schemes CS 1, 2, 3, 4
- CSD up to 14.4 kbps
- USSD
- Non transparent mode
- PPP-stack

### **Specifications for SMS via GSM/GPRS**

- Point to point MO and MT
- SMS cell broadcast
- Text and PDU mode

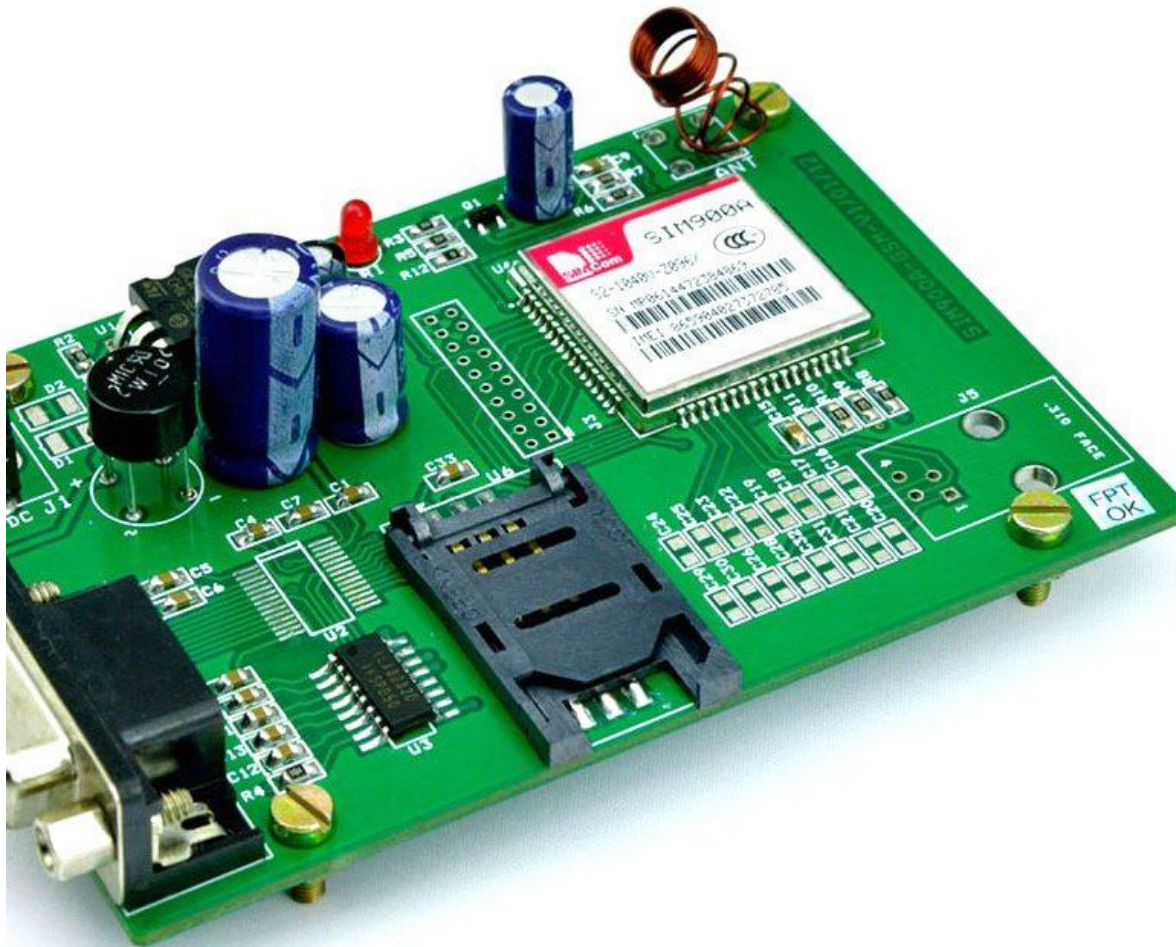
### **Software features**

- 0710 MUX protocol
- embedded TCP/UDP protocol
- FTP/HTTP

### **Special firmware**

- FOTA
- MMS
- Java (cooperate with Iasolution)





Basic AT Co  
**SIM**  
GSM/GP

### Connecting your gsm to arduino uno:

1. Insert your SIM card to GSM module and lock it.
2. power up your gsm by connecting it to Arduino's 5V and GND
3. Connect the Antenna
4. Now wait for some time (say 1 minute) and see the blinking rate of 'status LED' or 'network LED'  
//GSM module will take some time to establish connection with mobile network//
5. Once the connection is established successfully, the status/network LED will blink continuously every 3 seconds. You may try making a call to the mobile number of the sim card inside GSM module. If you hear a ring back, the gsm module has successfully established network connection.



## EXPLANATION OF COMMONLY USED AT COMMANDS

- ❖ AT - This command is used to check communication between the module and the computer. For example,

AT

OK

The command returns a result code OK if the computer (serial port) and module are connected properly. If any of module or SIM is not working, it would return a result code ERROR.

- ❖ +CMGF - This command is used to set the SMS mode. Either text or PDU mode can be selected by assigning 1 or 0 in the command.

SYNTAX: AT+CMGF=<mode>

0: for PDU mode

1: for text mode

The text mode of SMS is easier to operate but it allows limited features of SMS. The PDU (protocol data unit) allows more access to SMS services but the operator requires bit level knowledge of TPDU's. The headers and body of SMS are accessed in hex format in PDU mode so it allows availing more features. For example,

AT+CMGF=1 OK

- ❖ 3) +CMGW - This command is used to store message in the SIM. SYNTAX: AT+CMGW="Phone number"> Message to be stored Ctrl+z

As one types AT+CMGW and phone number, „>“ sign appears on next line where one can type the message. Multiple line messages can be typed in this case. This is why the message is terminated by providing a „Ctrl+z“ combination. As Ctrl+z is pressed, the following information response is displayed on the screen.

+CMGW: Number on which message has been stored

- ❖ +CMGS - This command is used to send a SMS message to a phone number. SYNTAX: AT+CMGS= serial number of message to be send. As the command AT+CMGS and serial number of message are entered, SMS is sent to the particular SIM. For example,

AT+CMGS=1

OK

- ❖ ATD - This command is used to dial or call a number.

SYNTAX: ATD<Phone number>(Enter) For example, ATD123456789

- ❖ ATA - This command is used to answer a call. An incoming call is indicated by a message „RING“ which is repeated for every ring of the call. When the call ends „NO CARRIER“ is displayed on the screen.

SYNTAX: ATA(Enter) As ATA followed by enter key is pressed, incoming call is answered. For example,

RING

RING

ATA

- ❖ ATH - This command is used to disconnect remote user link with the GSM module. SYNTAX:  
ATH (Enter)

## Chapter-5

### Buzzer

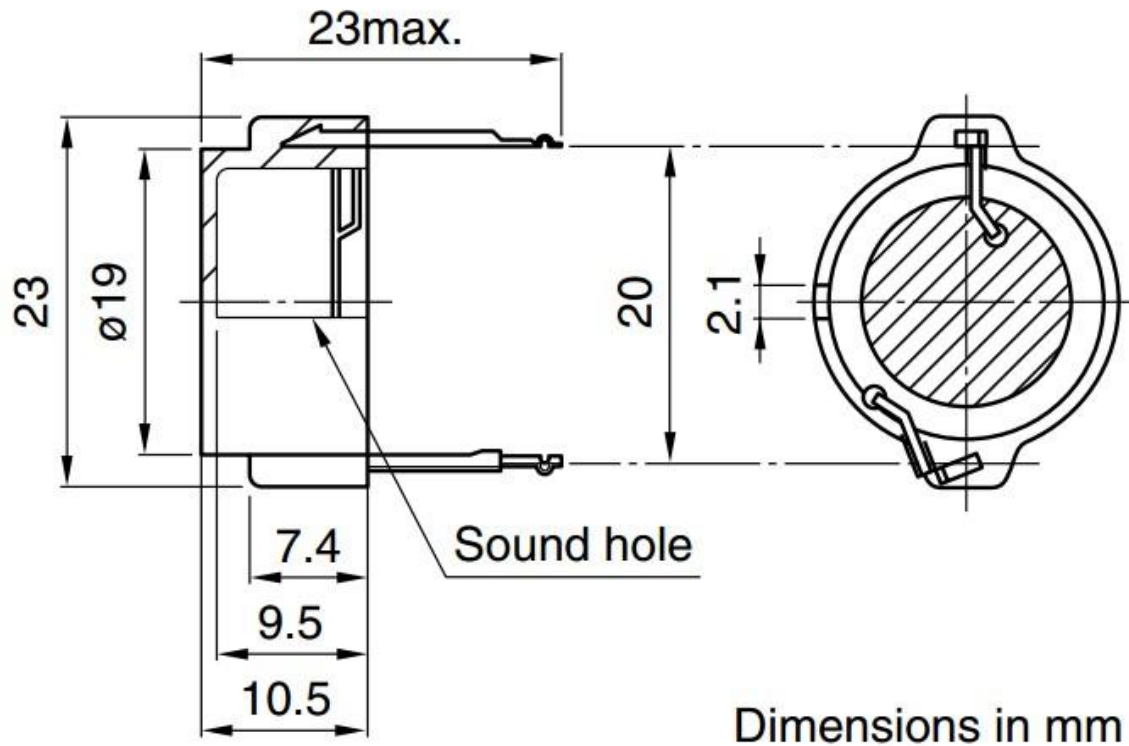


#### Overview

Buzzer as shown in Figure is an audio signaling device. The typical uses of buzzers are for alarms, timers and confirmation of user input such as a mouse click or keystroke. The project used an electronic type of buzzer which is a piezoelectric element that driven by an Arduino microcontroller signals.

#### Applications

- ❖ Electric ranges
- ❖ washing machines
- ❖ computer terminals
- ❖ various devices that require speech synthesis output.


**Features:**

- The PS series are high-performance buzzers that employ unimorph piezoelectric element and are designed for easy incorporation into various circuits.
- They feature extremely low power consumption in comparison to electromagnetic units.
- Because these buzzers are designed for external excitation, the same part can serve as both a musical tone oscillator and a buzzer.
- They can be used with automated inserters. Moisture-resistant models are also available.
- The lead wire type(PS1550L40N) with both-sided adhesive tape installed easily is prepared.

## CHAPTER-6

### LED

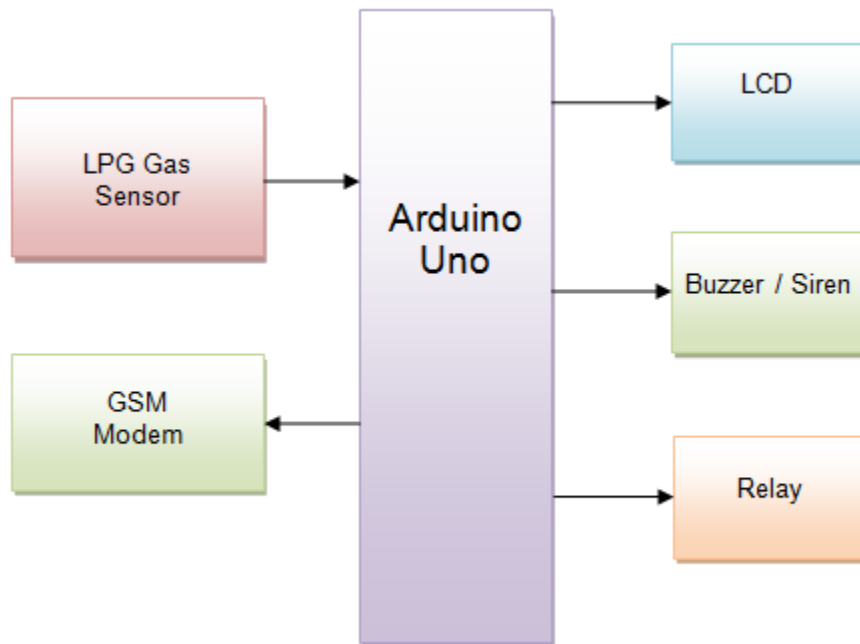


#### 6.1 Overview

When a diode is forward biased which is switch on, electron are able to recombine with holes within the devices, releasing energy in the form of photon. This effect is called electroluminescence and the colour of the light is determined by the energy gap of the semiconductor. LED are usually integrated optical components are used to shape its radiation pattern and assist in the reflection.

## CHAPTER-7

### BLOCK DIAGRAM



## Chapter -8

### CODE IMPLEMENTATION

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(9, 10);

int sensor=7;
int speaker=2;
int gasvalue, Gas, Gas_shut_val;
int GasLeakStatus;
int sms=0;
int valve=13;
int x=0;

void setup()
{

pinMode(sensor,INPUT);
pinMode(speaker,OUTPUT);
pinMode(valve,OUTPUT);
mySerial.begin(9600);
Serial.begin(9600);

}

void loop()
{
CheckGas();
CheckShutDown();
if(x=0)
{
digitalWrite(valve, HIGH);//switching on the valve
}
}

void CheckGas()
{

Gas=Scan();
if(Gas==LOW)
{
SetAlert(); // Function to send SMS Alerts
digitalWrite(valve,LOW);//shutting down valve
x=1;
}}
}
```

```

int Scan()
{
    gasvalue=digitalRead(sensor); // reads the sensor output (Vout of LM35)

    return gasvalue; // returns temperature value in degree celsius
}

void SetAlert()
{
    digitalWrite(speaker,HIGH);
    while(sms<1) //Number of SMS Alerts to be sent
    {
        SendTextMessage(); // Function to send AT Commands to GSM module
    }
    GasLeakStatus=1;
}

void CheckShutDown()
{
    if(GasLeakStatus==1)
    {

        Gas_shut_val=Scan();
        if(Gas_shut_val==HIGH)
        {

            digitalWrite(speaker,LOW);
            sms=0;
            GasLeakStatus=0;
        }}}

void SendTextMessage()
{
    mySerial.println("AT+CMGF=1"); //To send SMS in Text Mode
    delay(1000);
    mySerial.println("AT+CMGS=\"+918607809200\"\\r"); // change to the phone number you using
    delay(1000);
    mySerial.println("Alert \\n Gas Leakage Detected !");//the content of the message
    delay(200);
    mySerial.println((char)26);//the stopping character
    delay(1000);
    sms++;
}

```



## **CHAPTER-9**

### **APPLICATIONS AND ADVANTAGES**

#### **APPLICATIONS**

- Protection from any gas leakage in cars
- For safety from gas leakage in heating gas fired appliances like boilers, domestic water heaters
- Large industries which uses gas as their production
- For safety from gas leakage in cooking gas fired appliances like ovens, stoves etc.

#### **ADVANTAGES**

- It is used in house as LPG leakage detection
- It also detects alcohol so it is used as liquor tester.
- The sensor has excellent sensitivity combined with a quick fast response time.
- The system is highly reliable, tamper-proof and secure.
- In the long run the maintenance cost is very less when Compared to the present systems.
- It is possible to get instantaneous results and with high accuracy.

## **CHAPTER-10**

### **RESULT**

Overall system was designed and tested by introducing the small amount of LPGas near gas sensor module. The system detects the level of gas in the air if it exceeds the safety level it activates the alarm which includes Buzzer to alert the user at home in abnormal condition and to take the necessary action.

## **CHAPTER-11**

### **FUTURE SCOPE**

With recent development in technology, improvement would be to accommodate with GSM&GPS technology with multiple receiver MODEMS at different positions in the geographical areas by using microcontrollers and temperature sensors. Multilingual display can be another added variation in the project. Audio output can be introduced to make it user Friendly.

## **CHAPTER-12**

### **SOLENOID VALVE**

The definition of a solenoid valve is an electro-mechanical valve that is commonly employed to control the flow of liquid or gas. There are various solenoid valve types, but the main variants are either pilot operated or direct acting. Pilot operated valves, the most widely used, utilise system line pressure to open and close the main orifice in the valve body.

While Direct operated solenoid valves directly open or close the main valve orifice, which is the only flow path in the valve. They are used in systems requiring low flow capacities or applications with low pressure differential across the valve orifice.

How a solenoid valve works is by controlling the flow of liquids or gases in a positive, fully-closed or fully-open mode. They are often used to replace manual valves or for remote control. Solenoid valve function involves either opening or closing an orifice in a valve body, which either allows or prevents flow through the valve. A plunger opens or closes the orifice by raising or lowering within a sleeve tube by energising the coil.

Solenoid valves consist of a coil, plunger and sleeve assembly. In normally closed valves, a plunger return spring holds the plunger against the orifice and prevents flow. Once the solenoid coil is energised, the resultant magnetic field raises the plunger, enabling flow. When the solenoid coil is energised in a normally open valve, the plunger seals off the orifice, which in turn prevents flow.

In most flow control applications, it is necessary to start or stop the flow in the circuit to control the fluids in the system. An electronically operated solenoid valve is usually used for this purpose. By being solenoid actuated, solenoid valves can be positioned in remote locations and may be conveniently controlled by simple electrical switches.

Solenoid valves are the most frequently used control elements in fluidics. They are commonly used to shut off, release, dose, distribute or mix fluids.

## CONCLUSION

Overall system is to be designed and tested by introducing the small amount of LPG gas near gas sensor module. The system detects the level of gas in the air if it exceeds the safety level, this system automatically alerts the people by Buzzer and take the necessary action of preventing the gas leakage.

In recent households, the use of LPG is taking a big roll. From the use of cylinder up to the use of petroleum pipelines. The biggest advantage by using this technology is security. And our project will prove to be boom for households, hostels, vehicles and industries. It is an efficient home security system and also can be used in industries and other places to detect gas leaks. The cost involved in developing the system is significantly low and is much less than the cost of gas detectors commercially available in the market.