GAS LEAKAGE SENSOR USING GAS SENSOR AND ARDUINO

P.SAI SUHAS

AP19110010318

pulipakasuhas2611@gmail.com

IOT(Internet of things)

SRM UNIVERSITY AP AMARAVATI

Under the guidance of: Madhav(APSSDC)

CONTENTS

ABSTRACT

Liquefied Petroleum Gas (LPG) is a main source of fuel, especially in urban areas because it is clean compared to firewood and charcoal. Gas leakage is a major problem in the industrial sector, residential premises, etc. Nowadays, home security has become a major issue because of increasing gas leakage. Gas leakage is a source of great anxiety with ateliers, residential areas and vehicles like Compressed Natural Gas (CNG), buses, and cars which are run on gas power. One of the preventive methods to stop accidents associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The aim of this paper is to propose and discuss a design of a gas leakage detection system that can automatically detect, alert and control gas leakage. This proposed system also includes an alerting system for the users. The system is based on a sensor that easily detects a gas leakage.

INTRODUCTION

The usage of the gas brings great problems in the domestic as well as working places. The inflammable gas such as Liquidized petroleum gas (LPG), which is excessively used in the house and at work places. The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, by keeping it in the concept of the project we have determined to develop an examining system which finds the leak of LPG gas and protects the workplaces by taking correct precautions at the correct time. This system provides the information such as when a gas leakage is noticed, sensors of in the project are used to notice the gas leakage and immediately turns ON the buzzer for the danger indication.

Gas leakage is a serious problem and nowadays it is observed in many places like residences, industries, and vehicles like Compressed Natural Gas (CNG), buses, cars, etc. It is noticed that due to gas leakage, dangerous accidents occur. The Liquefied petroleum gas (LPG), or propane, is a flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, and vehicles because of its desirable properties which include high calorific value, less smoke, less soot, and meager harm to the environment. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. These gases can catch fire easily.

In homes, LPG is used mainly for cooking purposes. When a leak occurs, the leaked gases may lead to an explosion. Gas leakage leads to various accidents resulting in both material loss and human injuries. Home fires have been occurring frequently and the threat to human lives and properties has been growing in recent years. The risks of explosion, fire, suffocation are based on their physical properties such as toxicity, flammability, etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. The Bhopal gas tragedy is an example of accidents due to gas leakage.

The reason for such explosions is due to substandard cylinders, old valves, no regular checking of gas cylinders, worn out regulators and a lack of awareness of handling gas cylinders. Therefore, the gas leakage should be detected and controlled to protect people from danger. An odorant such as ethane thiol is added to LPG, so that leaks can be detected easily by most people. However, some people who have a reduced sense of smell may not be able to rely upon this inherent

safety mechanism. A gas leakage detector becomes vital and helps to protect people from the dangers of gas leakage.

Buzzer is a clear indication of gas leakage. By the detection of the hazardous gas the alerting message reached the person who has control over it from the GSM. Detection of the gas leakage is important and halting leakage is important equally. The main objective of this project is that it is extremely accurate with the least cost. This project system is best to detect gas leakage and also warn people around by buzzer beep sound for preparatory safety calculations.

This device is at its initial level of development and with modification in future this device will also trip off the mains supply to ensure better safety and surety. The gas leak detector device can find application not only at residential homes but also it is applicable to hotels, restaurants and even in industries where LPG gas is used for some or the other purposes.

OBJECTIVE & SCOPE

To design and develop a LPG Gas leakage monitoring & alert system using Arduino.

Justification of Study

The LPG gas leakage problem is increasing day by day. For this reason, designed and developed a system of LPG Gas leakage monitoring and alert system using Arduino. So this IOT based system awards people for preventing accidents and safety from Damage.

Scope of Study

Due to the increase in fuel costs, we use LPG gas in most petrol/diesel vehicles. The use of LPG gas in cars and homes is very risky. The LPG gas cylinders used at home

and elsewhere are in the same condition, which is mainly due to LPG gas leakage accidents. For the protection and security of LPG gas explosion problems, we design the IoT based system to prevent home and vehicle accidents.

COMPONENTS & DESCRIPTION

- Arduino UnoR3

- Gas Sensor

- Piezo

- 22 kΩ , 100 Ω , 220 Ω Resistor's

- Red, Green, Orange LED'S

ARDUINO UNO R3-

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be

used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (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 an ATmega16U2 programmed as a USB-to-serial converter. This auxiliary microcontroller has its own USB bootloader, which allows advanced users to reprogram it.

GAS SENSOR-

Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gas. They are commonly used to detect toxic or explosive gasses and measure gas concentration. Gas sensors are employed in factories and manufacturing facilities to identify gas leaks, and to detect smoke and carbon monoxide in homes.

Gas sensors vary widely in size (portable and fixed), range, and sensing ability. They are often part of a larger embedded system, such as hazmat and security systems, and they are normally connected to an audible alarm or interface. Because gas

sensors are constantly interacting with air and other gasses, they have to be calibrated more often than many other types of sensors.

PIEZO-
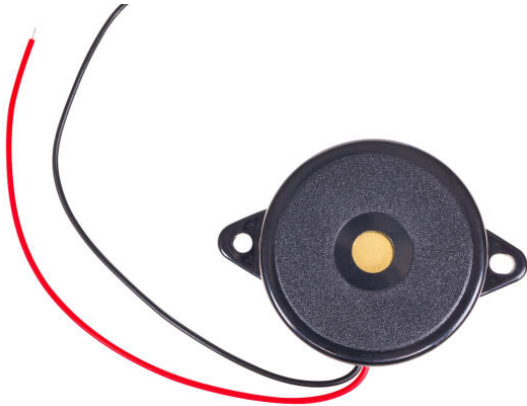
Piezoelectric Sounders / Buzzers are sound components prepared by incorporating a piezoelectric vibration plate in a plastic case (resonator). These are sound components which generate sound suitable for use as input signals (including multi-tone, melody and so forth) without built-in oscillator circuits.

This characteristic allows them to be used in a wide range of applications. They come as the SMD type, which is optimal for small, high-density mounting and the pin type, which can be used for general purposes. In general, Piezoelectric buzzers are sound components which generate a monotone using a built-in oscillation circuit.

RESISTOR-
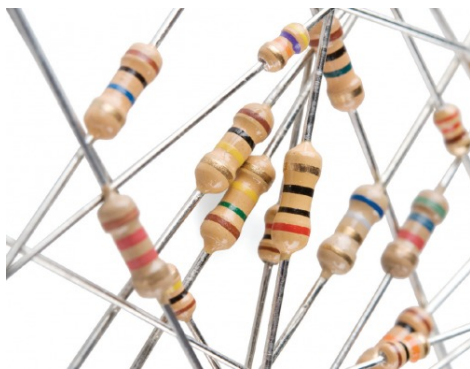
The resistor is a passive electrical component to create resistance in the flow of electric current. In almost all electrical networks and electronic circuits they can be found. The resistance is measured in ohms (Ω). Resistors are used for many purposes. A few examples include limiting

electric current, voltage division, heat generation, matching and loading circuits, gain control, and setting time constants.

They are commercially available with resistance values over a range of more than nine orders of magnitude. They can be used as electric brakes to dissipate kinetic energy from trains, or be smaller than a square millimeter for electronics.

LED'S-

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

SOFTWARE USED, CONNECTION AND SOURCE CODE

Software used for this project is Tinkercad which is a free online 3D modelling and circuit design simulation website.
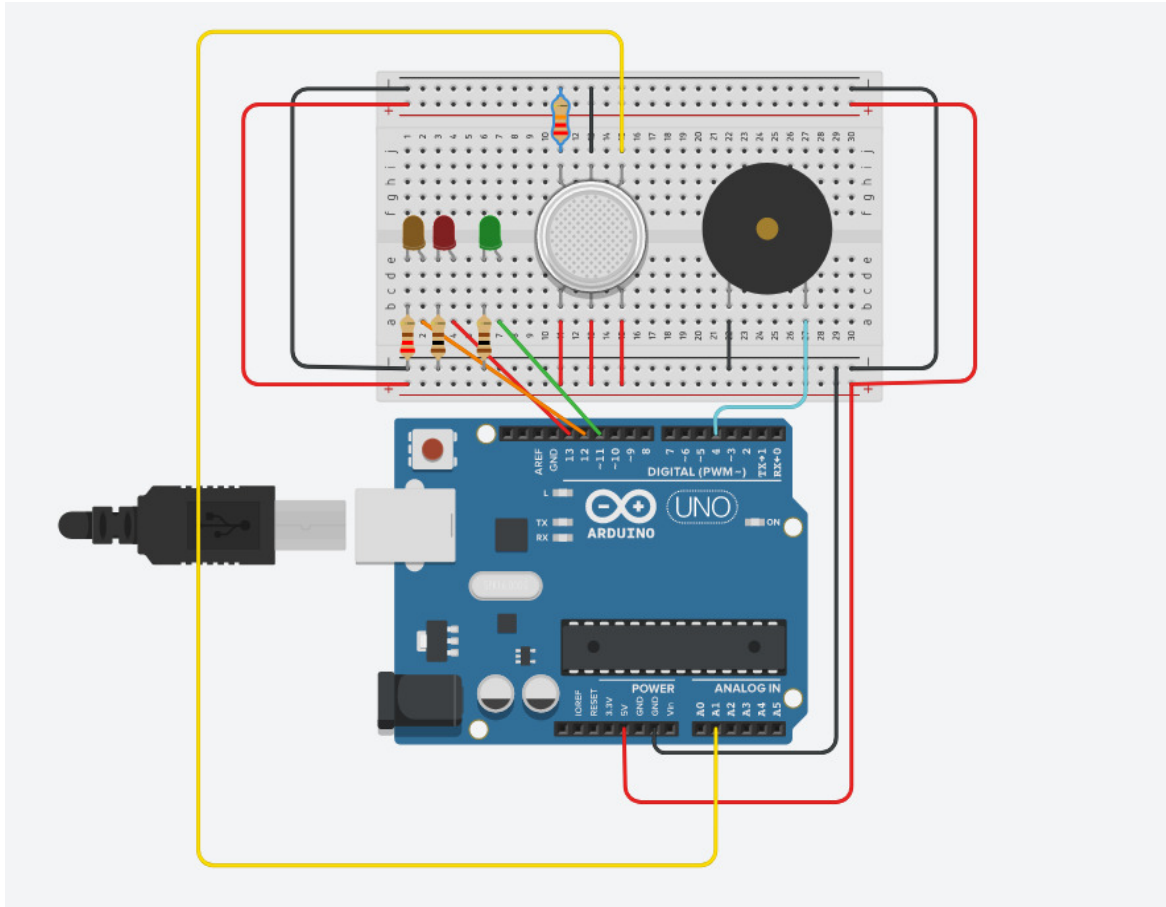
SOURCE CODE-

```
int redLed = 13;

int greenLed = 11;

int orngeLed = 12;

int buzzer = 4;

int concen = A1;



void setup()

{

  pinMode(redLed, OUTPUT);
```

```arduino
  pinMode(greenLed, OUTPUT);

  pinMode(orngeLed, OUTPUT);

  pinMode(buzzer, OUTPUT);

  pinMode(concen, INPUT);

  Serial.begin(9600);

}


void loop()

{

  int smok = analogRead(concen);


  Serial.print("Gas Conc. Level: ");

  Serial.println(smok);

  // Checks if it has reached the threshold value

 if (smok > 682 && smok < 740)

  {

        digitalWrite(orngeLed, HIGH);

        digitalWrite(greenLed, LOW);

        digitalWrite(redLed, LOW);

        tone(buzzer, 3000, 200);

  }

  else if(smok > 740)

  {

        digitalWrite(redLed, HIGH);

        digitalWrite(greenLed, LOW);

        digitalWrite(orngeLed, LOW);
```

```
        tone(buzzer, 1000, 200);

    }


    else
    {
        digitalWrite(redLed, LOW);
        digitalWrite(greenLed, HIGH);
        digitalWrite(orngeLed, LOW);
        noTone(buzzer);
    }
    delay(150);
}
```

WORKING

This system is based on the **ARDUINO UNO R3** and a **Gas sensor.** When the sensor detects the gas in the atmosphere the Orange Led blinks along with the buzzer and as the intensity of gas increases Red Led blinks with increase in buzzer volume. When there is no gas detected Green Led blinks without any buzzer. Buzzer mostly consists of a number of switches or sensors connected to the control unit which determines the work to be done, and usually illuminates the light on the appropriate button or control panel, and sounds the warning in the form of continuous intermediate burning beeping sound.

If the system detects the level of gas in the air that exceeds the safety level it will activate the alarm which includes the buzzer as mentioned earlier, to alert the users at home of the abnormal condition and to take any necessary action. The most tell-tale sign of a leak is the smell of gas in the home. However, in the case of

a carbon monoxide leak, there are also particular physical symptoms you may suffer from if there is a leak. The output result of this paper is that the leakage will be detected and stopped within 2 s after the leakage starts. This is an efficient method for automatically detecting and controlling the gas leakage.

RESULTS
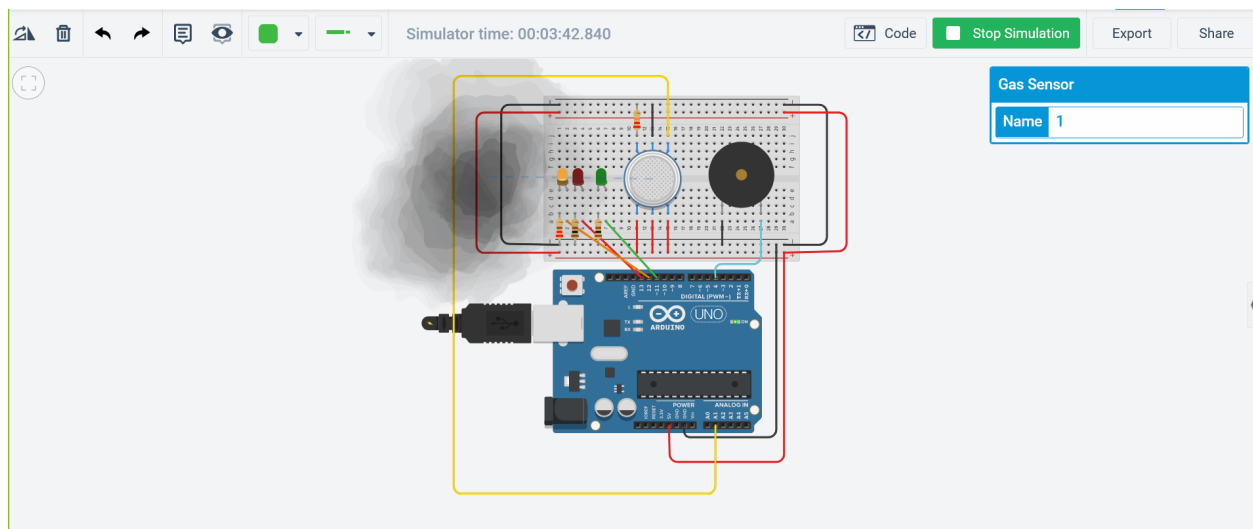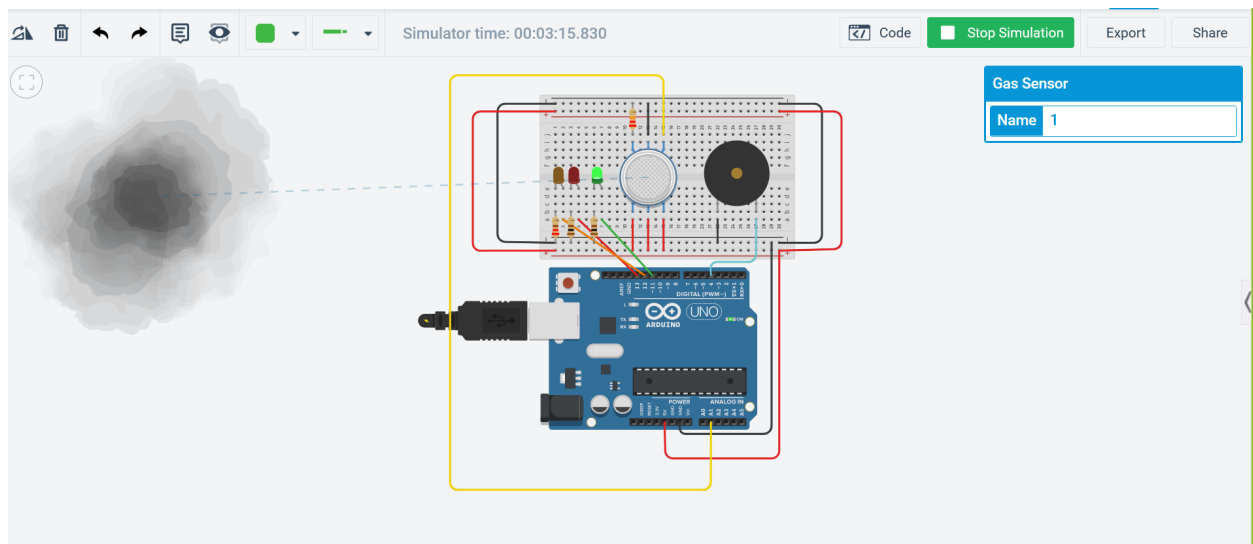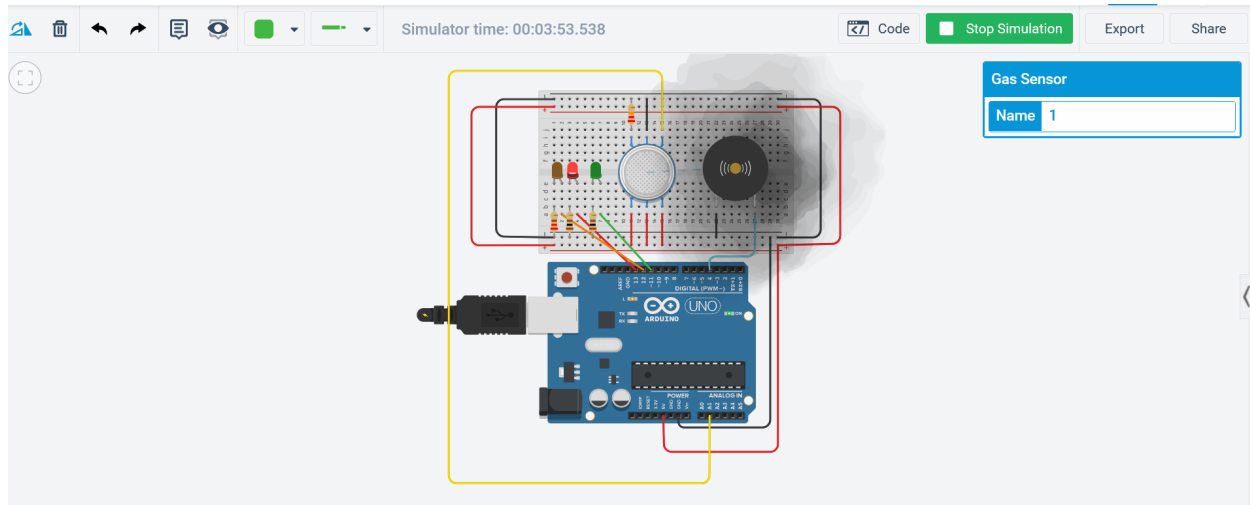
Safety plays a serious role in today's world and it's necessary that smart safety systems are to be enforced in places of education and work. The LPG or gas that is combustible mixture of organic compound gases utilized in use as fuel in abundant application like homes, hostels, industries, automobiles' vehicles attributable to its fascinating properties that embrace high hot price, that manufacture the less smoke, produces less soot and doesn't cause abundant hurt to the setting. Each cases burns to provide clean energy, but there's a significant drawback concerning their outpouring within the air. The gases being heavier than air don't disperse simply could and should and will} cause suffocation once indrawn conjointly once gas outpouring into the air may cause explosion' thanks to the explosion of LPG gas the no of deaths has been inflated in recent years. Thus This device is often used to avoid these issues by sleuthing and conjointly preventing outpouring of LPG. Gas leak discovery is the method of characteristic doubtless venturesome gas leaks by means of varied sensors.

CONCLUSION

Gas escape could result in severe accidents which end in material losses and human injuries. Gas escape happens mainly because of poor maintenance of apparatus and inadequate awareness of the individuals. Thus LPG escape detection is useful to stop accidents and to avoid wasting human lives. This paper conferred LPG escape detection and alert system using buzzer. This technique triggers a buzzer and rings it accordingly to alert individuals once LPG escape is detected. This technique is incredibly straightforward and yet reliable.

This is a low-cost, low power, lightweight, portable, safe, user friendly, efficient, and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will also lead to a rise in our economy, because when gas leaks it not only contaminates the atmosphere but also wastage of gases will hurt our economy. The proposed system will cost not more than 700 Rupees which is easily affordable even for poor people. In the current scenario it is noticed that much work has not been done for a smart gas detection system. In future, more advanced features will be integrated with this system which will provide users with more safety and relaxation. The proliferation of handheld devices has led to developments in the field of smart gas sensors, which has considerably widened their scope of application. The need for ensuring safety in workplaces is expected to be the key driving force for the market over the coming years.