

GAS LEAK IDENTIFICATION AND ALERT SYSTEM

Problem Statement:

Develop and build a Gas Leak Identification and Alert System using ESP8266 by employing advanced sensors for accurate identification, providing Real-time warnings to enhance safety.

Scope of Solution:

This device is important because there are many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion.

Required Components to develop solutions:

1. Arduino Uno R3:

Arduino Uno R3 is used as a controller in this proposed system. Arduino is a well-equipped Open-Source Prototype Platform which is based on easy-to-use hardware and software. It is very easy to program. Arduino boards are able to read inputs—light sensor, and can read any changes in physical environment with the help of suitable sensors, and activating another module (motor, publishing anything, any electrical part) online or offline. The Arduino software is convenient for beginners because of its easy interface. It will disentangle the process of creating a control environment by providing the standard and flexible board. This can be programmed and connected to the system without any requirement of PCB design. This software is inexpensive, cross-platform, simple programming environment, Open source extensible software and extensible hardware. It is flexible enough for advanced users. It works on platforms like Mac, Windows and Linux any other type of operating system. It is principal tool to learn new things and base of automation.

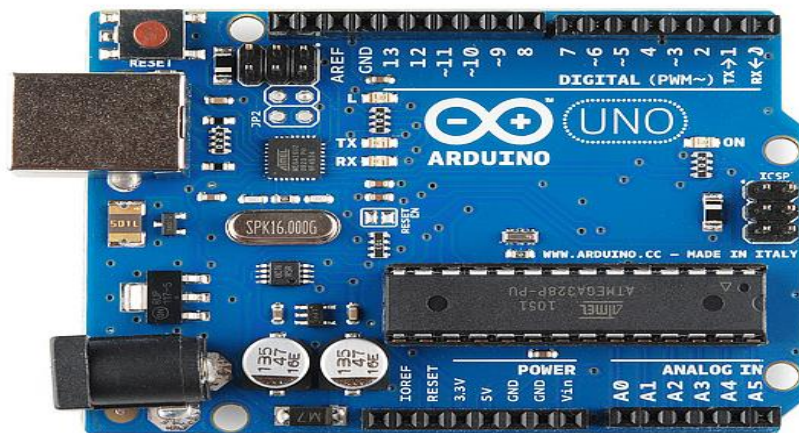


Fig: 1 Arduino UNO

2. Gas Sensor:

Gas sensors work on the principle of transforming the gas adsorption effects on the surface of the active material into a detectable signal in terms of its changed electrical, optical, thermal, mechanical, magnetic (magnetization and spin), and piezoelectric properties.

Infrared (IR) point sensors use radiation passing through a known volume of gas; energy from the sensor beam is absorbed at certain wavelengths, depending on the properties of the specific gas. For example, carbon monoxide absorbs wavelengths of about 4.2-4.5 μm .

The gas-sensing response, (R) is defined as the ratio of the resistance values of the sensor; in the detected gas to the resistance in the air; $R = R_g/R_a$. whereas the gas sensitivity is calculated by the following equation, $S (\%) = ((R_g - R_a))/R_a \times 100$, more details in the reference; Wang, C.

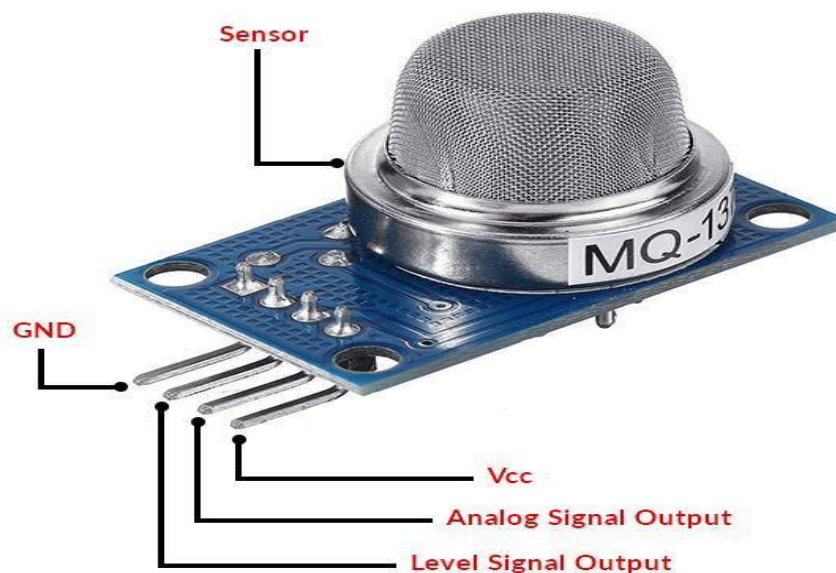


Fig :2 Gas Sensor

3. Buzzer:

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

The **pin configuration of the buzzer** is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative

terminal is represented with the ‘-’ symbol or short terminal and it is connected to the GND terminal.



Fig:3 Buzzer

Fig:5 LCD

4. LED:

LED stands for “light emitting diode”. LED lighting products produce light up to 90% more efficiently than incandescent light bulbs. How do they work? An electrical current passes through a microchip, which illuminates the tiny light sources we call LEDs and the result is visible light.

LED is a semiconductor device that emits light when current flows through it.



Fig:4 LED

5. Resistor:

Resistor is defined as. A passive electrical component with two terminals that are used for either limiting or regulating the flow of electric current in electrical circuits. The main purpose of resistor is to reduce the current flow and to lower the voltage in any particular portion of the circuit.



Fig:5 Resistor

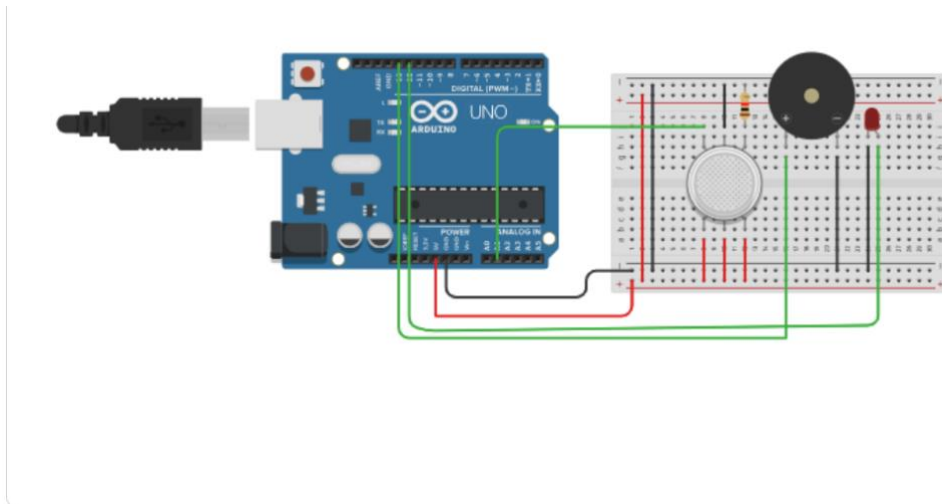
6. Connecting Wires:

A connecting wire allows travels the electric current from one point to another point without resistivity. Resistance of connecting wire should always be near zero. Copper wires have low resistance and are therefore suitable for low resistance.



Fig:6 connecting Wires

Simulated Circuit:

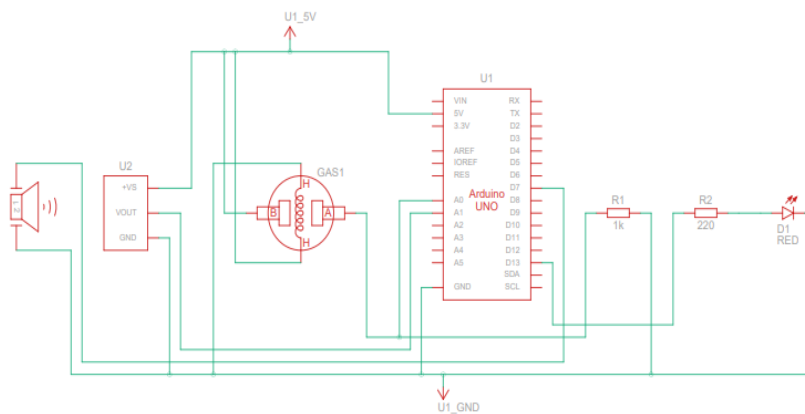


Video of the demo:



WhatsApp Video 2024-07-25 at 11.14.02_28c8eb55.mp4

Gerber File:



Code for the Solution:

```
int gasSensor=A1;
int buzzer=13;
int led=12;
void setup()
{
  pinMode(A1,INPUT);
  pinMode(buzzer,OUTPUT);
  pinMode(led,OUTPUT);
  Serial.begin(960);
}
void loop()
{
  int sensorValue=analogRead(gasSensor);
  Serial.print("GAS LEVEL:");
  Serial.println(sensorValue);
  delay(1000);
  if (sensorValue>250)
  {
    digitalWrite(buzzer,HIGH);
    digitalWrite(led,HIGH);
  }
  else
  {
    digitalWrite(buzzer,LOW);
    digitalWrite(led,LOW);
  }
}
```

CONCLUSION :

As we have seen that a number of deaths are caused due to the explosion of gas cylinders have increased in recent years. Here we plan to propose a microcontroller based model where a gas sensor issued to recognize unsafe gas spills. The detector flashes a green LED to show that there is no gas spillage. At the point when there is a gas spillage the LED flashes a red and sound a buzzer. The essential target of the project is to give a novel means to security. The primary objective of this basic gas leakage detector is its effortlessness and its capacity to caution its owner about the spillage of the LPG gas. The other preferred standpoint of this framework is its audio cautioning system. This system is executed effectively and low cost item. The proposed Arduino based gas leakage detector gives high and quick reaction than the manual task during critical situation spillage gases at private, lodging eateries, other commercial and industrial area to avoid from risking of human lives.

Note:

In the tinkercard simulator we cannot use the ESP8266. So that we use Arduino UNO board for the given project.