## **A Report**

#### ON

## **Project Based Learning: Digital Electronics**

#### "GAS / SMOKE DETECTION SYSTEM USING ARDUINOU"

BY

Samarth Jade-120042

Toshal kumbhar-120047

Ishan khidalkar-120044

**FY B. Tech - Electronics & Communication Engineering (Core)** 

**Subject Teacher: Prof. Vinod Jadhav** 

# SCHOOL OF ELECTRONICS & COMMUNICATION ENGINEERING MIT-WPU PUNE-411038

Academic Year 2023-2024

# Index

Sr. No.	Topic	Page No.
1	Introduction	
2	Components List	
3	Component Description	
4	Circuit Diagram	
5	Working	
6	Software code	
7	Results	
8	Applications	
9	References	

## Introduction

The purpose of the Gas/Smoke Detection System using Arduino is to create a reliable and cost-effective solution for monitoring air quality and detecting the presence of harmful gases or smoke in various environments. The project aims to enhance safety, provide early warnings, and enable timely responses to potential hazards.

# **Components List**

- 1) Arduino Uno R3 board
- 2) MQ-2 gas and smoke sensor module
- 3) Buzzer for alarm indication
- 4) Connecting wires
- 5) Power supply for Arduino (9v Battery)

# **Component Description**

**ARDUINO UNO** • An open source computer hardware that provides the necessary tools to create your sensor

## 1)Power Supply:

- **1)Power Input**: The board can be powered via a USB connection, an external power supply, or a battery.
- **2)Voltage:** The recommended operating voltage is 5V.

**2)USB Interface:** The Arduino Uno can be connected to a computer via a USB interface, allowing for programming and communication between the board and the computer.

**3)Programming:** Arduino Uno is programmed using the Arduino Integrated Development Environment (IDE), which simplifies the coding process.

#### **MQ-2 GAS SENSOR**

- Gas Sensors:MQ Series: These are popular gas sensors that come in various models for different gases such as MQ-2 (general combustible gas)
- It can detect flammable gas in a range of 300 10000ppm It is connected to potentiometer to adjust threshold frequency
- MQ-2 sensor threshold frequency is set to 400 Hz

#### BUZZER

#### 1. Sound Output (Decibel Level):

1)Output SPL (Sound Pressure Level): Indicates how loud the buzzer can sound.

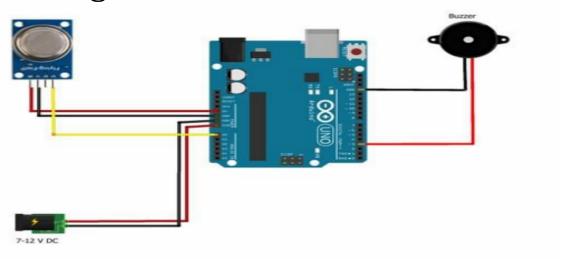
2)Example: 85dB at 1 meter.

## 2. Frequency:

1)Range: The frequency at which the buzzer produces sound.

2)Example: 2.5 kHz

# Circuit Diagram



# Working

#### 1)Sensor Input:

The gas/smoke sensor, such as the MQ-2, is employed to continuously monitor the air quality. This sensor can detect various gases, including methane, propane, carbon monoxide, and smoke particles.

#### 2) Analog Reading:

The analog output of the sensor is connected to one of the analog pins on the Arduino. The Arduino reads the analog signal to determine the concentration of gases in the environment.

#### 3) Threshold Detection:

A threshold value is set in the Arduino code to determine when an alarm should be triggered. When the sensor reading exceeds this threshold, it indicates the presence of potentially harmful gases or smoke.

#### 4) Alarm Activation:

An alarm, represented by a buzzer, is activated when the sensor reading surpasses the predefined threshold. This provides an audible alert to draw attention to the potential hazard.

## 5)Monitoring and Alerting:

The Arduino continuously monitors the sensor readings and triggers the alarm when necessary.

## Software code

```
// GAS DETECTOR
int Input = A0;
int Buzzer = 4;
// VAL INTEGER
int val;
int MAX = 400;
void setup() {
Serial.begin(9600);
pinMode(Input, INPUT);
pinMode(Buzzer,OUTPUT);
}
void loop() {
val = analogRead(A0);
if (val \geq MAX) {
digitalWrite(Buzzer,HIGH);
Serial.println("GAS LEAKING");
```

```
else {
digitalWrite(Buzzer,LOW);
Serial.println("NORMAL");
}
```

## Results

The Gas/Smoke Detection System using Arduino serves as an effective and versatile solution for enhancing safety in various environments. By continuously monitoring air quality and detecting the presence of harmful gases or smoke, the system provides early warnings, allowing for timely responses to potential hazards. The project has applications ranging from residential safety to industrial and agricultural settings, showcasing its adaptability and relevance across diverse scenarios.

In conclusion, the Gas/Smoke Detection System fulfills its purpose of creating a reliable and cost-effective means of safeguarding lives and assets.

# **Applications**

## 1)Home Safety:

1. Detect gas leaks in kitchens (e.g., propane, methane) to prevent potential fire hazards.

2. Monitor for the presence of carbon monoxide (CO) in living spaces, ensuring the safety of occupants.

#### 2)Industrial Settings:

- 1. Monitor air quality in industrial environments to ensure the safety of workers.
- 2. Detect and alert for the presence of harmful gases in factories or chemical processing plants.

#### 3) Environmental Monitoring:

- 1. Detect smoke or air pollution in specific areas, especially in regions prone to wildfires.
- 2. Monitor air quality in urban areas for pollution control and public health purposes.

#### 4)Laboratories:

- 1. Ensure safety in laboratories by detecting and alerting the presence of hazardous gases.
- 2. Monitor for potential leaks of volatile substances.

## 5) Greenhouses:

- 1. Monitor the air quality in greenhouses to ensure optimal conditions for plant growth.
- 2. Detect any gas leaks that could harm plants or pose a risk to greenhouse workers.

## 6) Vehicle Garages:

- 1. Detect the presence of gases such as propane or natural gas in vehicle repair or maintenance garages.
- 2. Enhance safety measures to prevent accidents and ensure a healthy working environment.

# References

- Wikipedia ( https://www.wikipedia.org)
- Arduino Stack Exchange( <a href="https://arduino.stackexchange.com/">https://arduino.stackexchange.com/</a>)