



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 3, March 2024

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423



9940 572 462



6381 907 438



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# Automatic Smoke Detector using Arduino Uno Board

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**ABSTRACT:** Now a day's automatic fire detection and control is becoming very essential to reduce the fire in the building and industry. Monitoring commercial and residential areas all-round is an effective method to reduce personal and property losses due to fire disasters. Automatic fire alarm system provides real time surveillance, monitoring and automatic alarm. A key aspect of fire protection is to identify a developing fire emergency in a timely manner, and to alert the building's occupants and fire emergency organizations. This is the role of fire detection and alarm systems. Generally fire detectors are designed to respond at an early stage to one more of the four major characteristics of combustion such as heat, smoke, flame or gas. No single type of detector is suitable for all types of premises or fires. Heat detectors respond to the temperature rise associated with a fire and smoke detector respond to the smoke gas generated due to fire. Large numbers of small fire detectors should report their information to the control center of a building or a block. But the cost of wiring is very high in traditional wired fire alarm systems. This paper is entitled automatic smoke detector and fire alarm. This proposed work is to provide best security from fire asserts by using new technology. A smoke detector is strictly a sensing device, which senses the smoke and sends a signal to a buildings fire alarm system to activate an audible and sometimes visual warning or alarm and simultaneously to switch on the motor to pump the water to spray on fire automatically. It operates by using light dependent resistor which can be used as a sensor to create a smoke detection alarm systems and can be used in industries, residential, universities, offices and different companies to protect the goods, security ware houses etc. A fire alarm circuit is very useful for security reasons. Equipment specifically manufactured for these purposes are selected and standardized installation methods are anticipated during the design. The key advantage of smoke detectors is its ability to identify a fire while it is still in its incipient. As such, they provide added opportunity for emergency personnel to respond and control the developing fire before severe damage occurs. They are usually the preferred detection method in life safety and high content value applications.

**KEYWORDS:** Fire detection, Heat Detector, Sensing device

## I. INTRODUCTION

Now a days automatic fire detection and control is becoming very essential to reduce the fire in the building and industry. Monitoring commercial and residential areas all-round is an effective method to reduce personal and property losses due to fire disasters. Automatic fire alarm system provides real time surveillance, monitoring and automatic alarm. A key aspect of fire protection is to identify a developing fire emergency in a timely manner, and to alert the building's occupants and fire emergency organizations. This is the role of fire detection and alarm systems. Generally fire detectors are designed to respond at an early stage to one more of the four major characteristics of combustion such as heat, smoke, flame or gas. No single type of detector is suitable for all types of premises or fires. Heat detectors respond to the temperature rise associated with a fire and smoke detector respond to the smoke gas generated due to fire. Large numbers of small fire detectors should report their information to the control center of a building or a block. But the cost of wiring is very high in traditional wired fire alarm systems.

A smoke detector is a device that senses smoke, typically as an indicator of fire. Smoke detectors are usually housed in plastic enclosures, typically shaped like a disk about 150 millimetres (6 in) in diameter and 25 millimetres (1 in) thick, but shape and size vary. Smoke can be detected either optically (photoelectric) or by physical process (ionization). Detectors may use one or both sensing methods. Sensitive alarms can be used to detect and deter smoking in banned areas. Smoke detectors in large commercial and industrial buildings are usually connected to a central fire alarm system.

Household smoke detectors, also known as smoke alarms, generally issue an audible or visual alarm from the detector itself or several detectors if there are multiple devices interlinked. Household smoke detectors range from individual battery-powered units to several interlinked units with battery backup. With interlinked units, if any unit detects smoke, alarms will trigger at all of the units. This happens even if household power has gone out. Commercial smoke detectors issue a signal to a fire alarm control panel as part of a fire alarm system. Usually, an individual commercial smoke detector unit does not issue an alarm; some, however, do have built-in sounders. The risk of dying in a residential fire is cut in half in houses with working smoke detectors. The US National Fire Protection Association reports 0.53 deaths per 100 fires in homes with working smoke detectors compared to 1.18 deaths without (2009–2013). However, some homes do not have any smoke alarms, and some homes do not have any working batteries in their smoke alarms.

This paper is entitled automatic smoke detector and fire alarm. This proposed work is to provide best security from fire asserts by using new technology. A smoke detector is strictly a sensing device, which senses the smoke and sends a signal to a buildings fire alarm system to activate an audible and sometimes visual warning or alarm and simultaneously to switch on the motor to pump the water to spray on fire automatically. It operates by using light dependent resistor which can be used as a sensor to create a smoke detection alarm systems and can be used in industries, residential, universities, offices and different companies to protect the goods, security ware houses etc. A fire alarm circuit is very useful for security reasons. Equipment specifically manufactured for these purposes are selected and standardized installation methods are anticipated during the design. The key advantage of smoke detectors is its ability to identify a fire while it is still in its incipient. As such, they provide added opportunity for emergency personnel to respond and control the developing fire before severe damage occurs. They are usually the preferred detection method in life safety and high content value applications.

## II. RELATED WORK

The A smoke detector is a device that senses smoke typically as an indicator of fire or non smoking zone. In order to ensure human safety and safeguard property against fire in both domestic and commercial settings, different solutions for smoke detection have been developed. These designs vary depending on the method of smoke detection. However, the different designs are derived

The two basic types of smoke detectors, namely:

1. The photoelectric smoke detector
2. The ionization chamber smoke detector (ICSD)

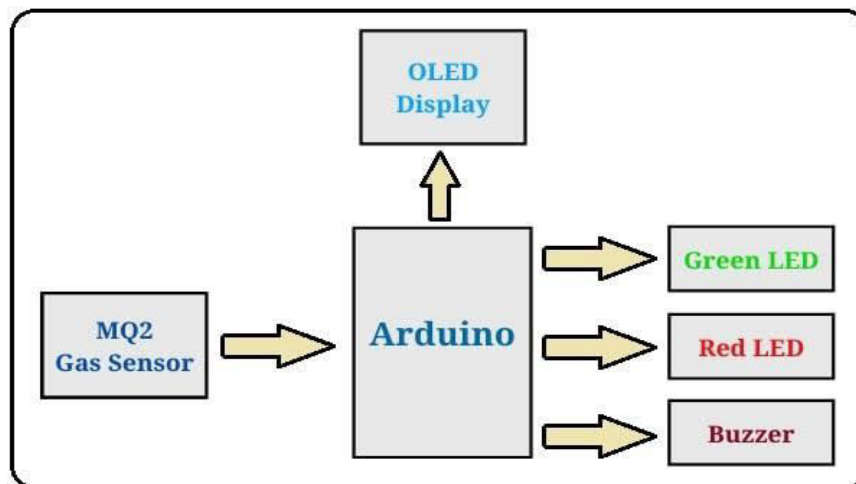
The photoelectric smoke detector uses an optical beam to search for smoke. When smoke particles cloud the beam, a photoelectric cell senses the decrease in light intensity and triggers an alarm. This type of smoke detector reacts most quickly to smoldering fires that release relatively large amounts of smoke. On the other hand, the ionization chamber smoke detector is quicker at sensing flaming fires that produce little smoke. It employs a radioactive material to ionize the air in a sensing chamber; the presence of smoke affects the flow of the ions between a pair of electrodes, which triggers the alarm. In a typical system, the radioactive material emits alpha particles that strip electrons from the air molecules, creating positive oxygen and nitrogen ions. The electrons attach themselves to other air molecules, forming negative oxygen and nitrogen ions. Two oppositely charged electrodes within the sensing chamber attract the positive and negative ions, setting up a small flow of current in the air space between the electrodes, but when the smoke particles enter the chamber, they attract some of the ions, disrupting the current flow.

Smoke is one of the air pollutions that is very detrimental to the health of both the smoker himself and others around him. Inhaling other people's smoke is even more dangerous than inhaling your own smoke. Even the dangers that must be borne by passive smokers are three times greater than the dangers of active smokers. Smoke is also very detrimental to the health of patients in hospitals, especially patients who suffer from asthma. For people with asthma who have problems in the respiratory tract, asthma can recur at any time due to inhaling smoke.

This research will develop a smart room that can detect smoke to maintain and protect the room from smoke that interferes with health. The tool to be developed uses an MQ2 sensor, LCD, exhaust fan, buzzer, and Arduino Uno microcontroller. Where an MQ2 sensor is needed to detect smoke around it, an LCD is needed to display the percentage of smoke, a microcontroller as a controller for all components, a buzzer is used as an alarm when the smoke level in the room is unhealthy, and the exhaust fan functions as a sucker for dirty air so that the smoke level in the room can be

reduced. The ability of this smoke detector to detect the presence of cigarette smoke in the air depends on the concentration of smoke, the distance from the source and sensor, and the direction of movement of the smoke. and from the results of tests carried out at three locations, it was explained that a closed room equipped with a colling fan to clean cigarette smoke levels made the room cleaner and reduced co2 levels.

### III. METHODOLOGY



A methodology for predicting smoke detector response with computational fluid dynamics is presented. The general phenomena associated with the overall smoke detection process are provided. The overall smoke detection process has been organized into five categories; property generation, bulk property transport, local property transport, sensor modulation, and alarm condition. Each component of the smoke detection process is discussed in terms of available methods for quantifying the associated variables. INTRODUCTION The accurate prediction of smoke detector response is an important consideration in assessing the performance of a detection system. As occupant and fire department notification can be dependent upon smoke detector response, more realistic objectives in terms of occupant evacuation times and fire department operations may be possible with reliable predictions of detector response. NIST's Fire Dynamics Simulator software, which is available for free and can be run on a PC, has removed some of the traditional barriers to using CFD in fire protection engineering. Therefore, the elements of a methodology for predicting smoke detector response with computational fluid dynamics are suggested. The objectives of this methodology are to provide a reference for predicting smoke detector response that can be used by fire protection engineers and practitioners as well as to serve as a stimulus for future research. Overall detector Methodology Property Generation The production of detectable properties by a fire is critical to predicting detector response. The most sophisticated and accurate predictive tool is of little value without proper inputs. Therefore, it is of primary importance to identify the combustion precursors or byproducts that influence the response of the sensor. In general terms, property generation is primarily influenced by the chemical composition of the fuel, local oxygen concentration, combustion mode, and heat release rate.

#### Arduino Code

```

//stored pins in variables
#define gasSensor AO
#define buzzer 0
#define ledGreen 1
#define ledRed 2
#define HIGH 600
void setup()
  
```

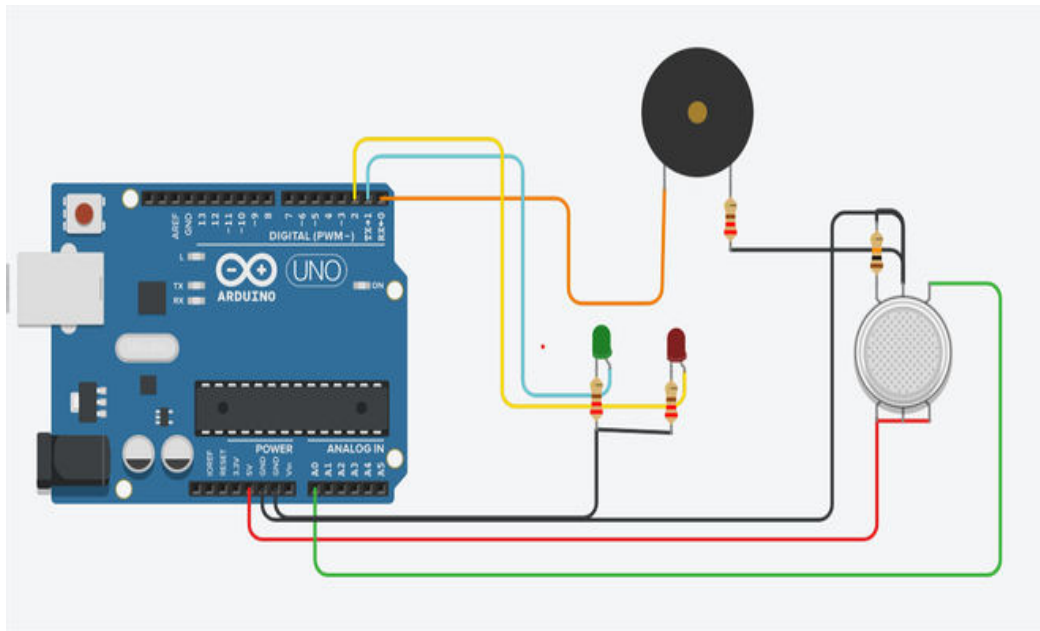




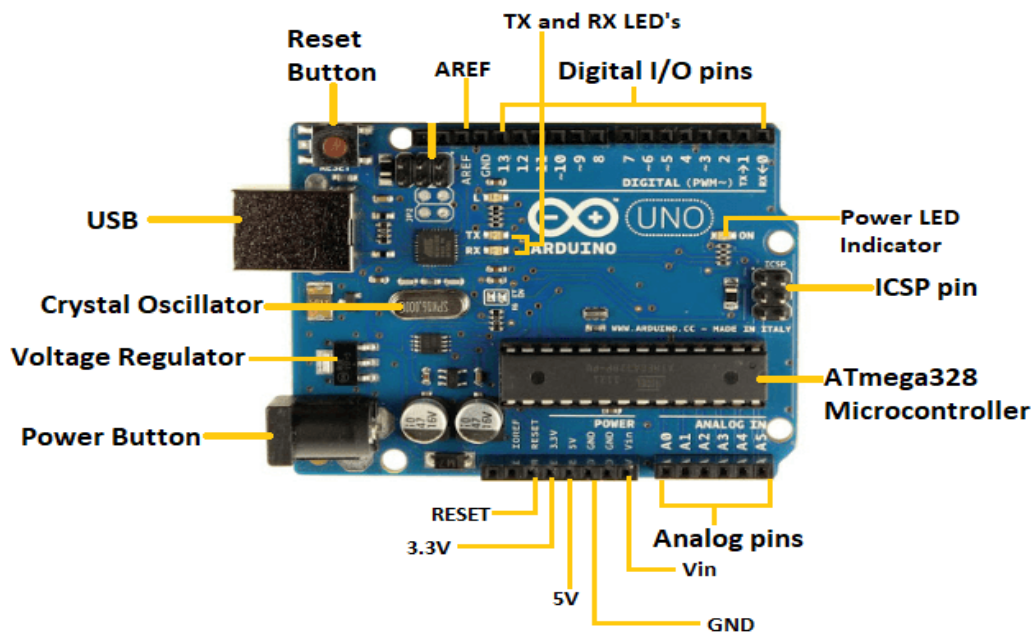
```
{
//Initialising all pins
pinMode(gasSensor, INPUT);
pinMode(buzzer, OUTPUT); pinMode(ledRed, OUTPUT);
pinMode(ledGreen, OUTPUT);
}
1000 5001
void loop()
{
//Read data from the sensor int gas_value = analogRead(gasSensor);
//check data from sensor if there is smoke,
if(gas_value> HIGH)
{
tone(buzzer, 1000, 500);
digitalWrite(ledRed, HIGH); digitalWrite(ledGreen, LOW);
}
else
{
noTone (buzzer); digitalWrite(ledGreen, HIGH); digitalWrite(ledRed, LOW);
}
delay(200);
}
```

#### IV. EXPERIMENTAL RESULTS

The hardware of this case consists of MQ2 Gas sensor, Arduino microcontroller, LCD that is connected with Arduino through an buzzer to control it. A fire alarm system is number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. Fire and smoke that spread within a building can be affected by various factors such as the geometry, dimension, layout and usage of the building. If a detector detects smoke or heat, or someone operates a break glass unit, then alarm sounders operate to warn others in the building that there may be a fire and to abandon.



(a) Circuit diagram



(b) Arduino uno

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