الجامعة الإسلامية العالمية شيتاغونغ

International Islamic University Chittagong

بسم الله الرحمن الرحيم

EEE PROJECT REPORT

GAS Leakage & Smoke Detector

COURSE TITTLE: Electrical Drives and Instrumentation

COURSE CODE: EEE-2421

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GAS Leakage & Smoke Detector

Introduction:

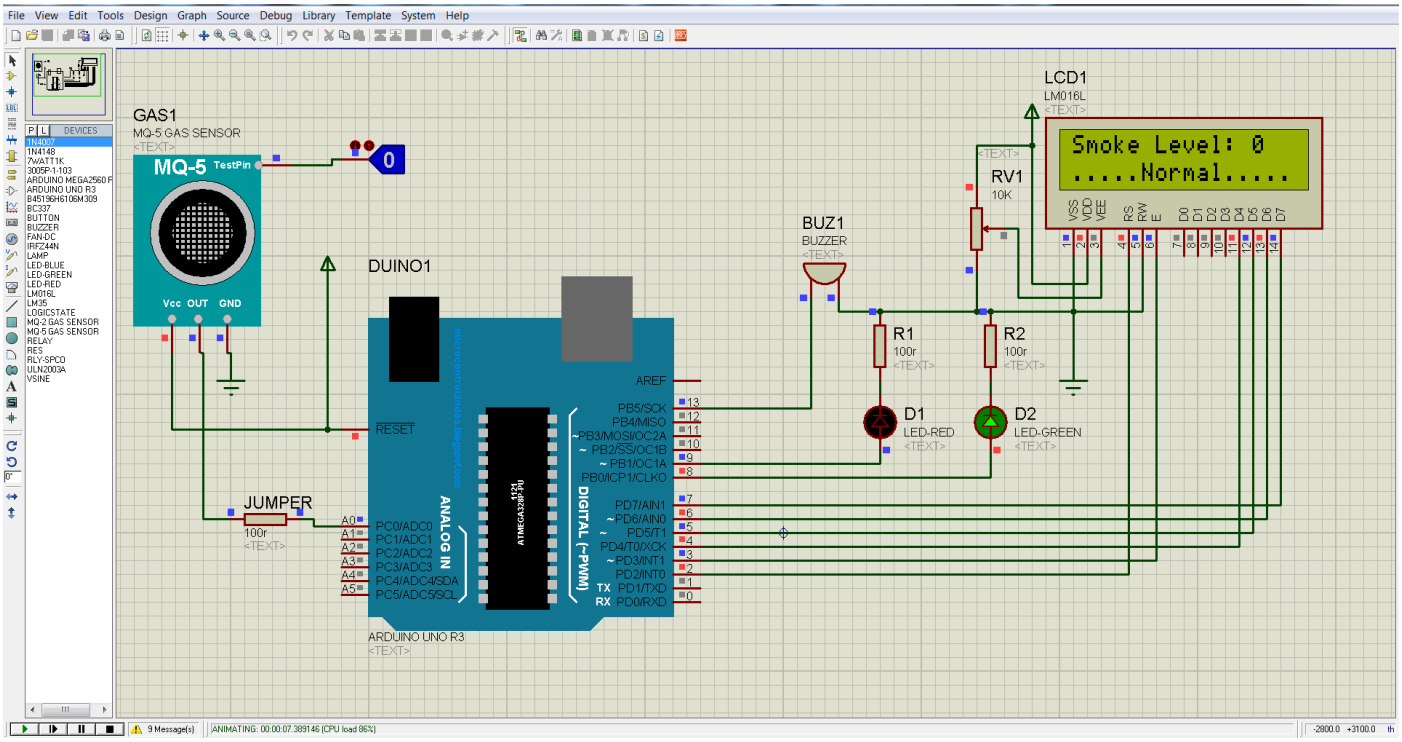
Gas and smoke detectors are essential safety devices that can save lives. They detect the presence of hazardous gases and smoke, and sound an alarm to alert people to the danger. Gas detectors can detect a variety of gases, including natural gas, propane, carbon monoxide, and methane. Smoke detectors detect smoke from fires, and can also detect some types of gases.

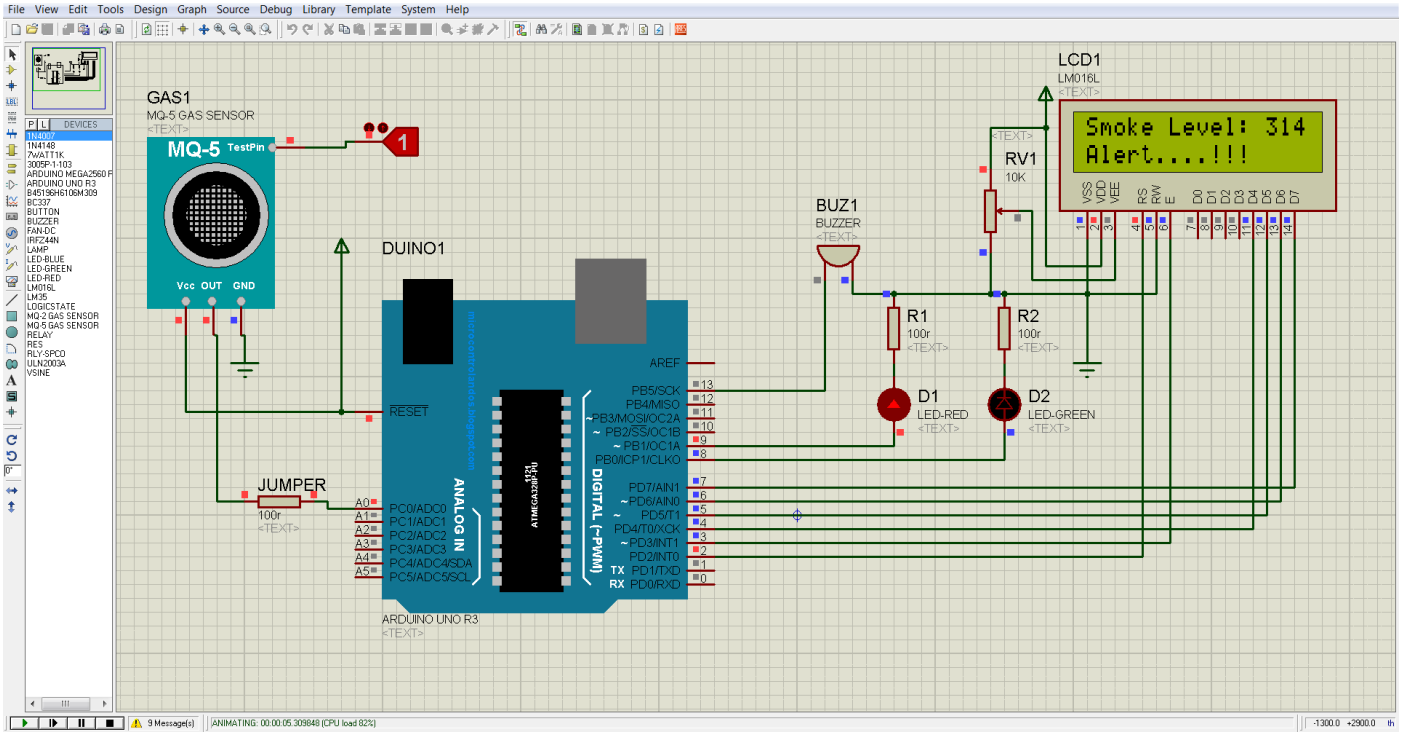
Gas and smoke detectors are typically installed in homes and businesses, and are required by law in many jurisdictions. They should be placed in areas where they are likely to detect a gas leak or fire early, such as near kitchens, fireplaces, and furnaces.

Required Equipment:

- ARDUINO UNO
- LED
- DISPLAY 16 * 6
- BREADBOARD
- RESISTOR
- RED LED
- GREEN LED
- BUZZER
- 9V BATTERY
- JUMP WIRE
- MQ5 SENSOR
- USB CABLE

Circuit Diagram:





Working Principle:

The MQ-5 gas sensor is a semiconductor sensor that is sensitive to a wide range of combustible gases, including methane, propane, butane, and liquefied petroleum gas (LPG). It works by detecting changes in the electrical conductivity of a tin dioxide (SnO2) semiconductor layer when exposed to combustible gases.

When the sensor is in clean air, the SnO2 layer has a high electrical resistance. However, when the sensor is exposed to combustible gases, the SnO2 layer becomes more conductive. This is because the combustible gases react with the oxygen molecules on the surface of the SnO2 layer, releasing electrons that make the layer more conductive.

The MQ-5 gas sensor has a heating element that is used to maintain the SnO2 layer at a constant temperature. This is necessary because the sensitivity of the sensor to combustible gases is affected by temperature.

The output of the MQ-5 gas sensor is an analog voltage that increases with the concentration of combustible gases in the air. This voltage can be measured using a microcontroller or other electronic device.

The MQ-5 gas sensor is typically used in conjunction with a microcontroller or other electronic device to monitor the concentration of combustible gases in the air. The sensor can be used in a variety of applications, including:

- Gas leak detection
- Fire detection
- Air quality monitoring
- Industrial process control

The MQ-5 gas sensor is a reliable and easy-to-use sensor for detecting combustible gases. It is widely used in a variety of applications, including gas leak detection, fire detection, air quality monitoring, and industrial process control.

STEP:

1. First, I got all the necessary equipment at hand.

2. Now connect DISPLAY 16*6 to the breadboard, as per the diagram.

3. I connected the MQ 5 sensor between the breadboard.

4. I connected the BUZZER according to the diagram.

5. Now connect the Resistor, Red LED, and Green LED as per Diagram.

6. Now connect the JUMP WIRE to ARDUINO UNO as per the diagram.

7. I uploaded the code to ARDUINO UNO through a USB cable.

8. Now our project is ready for testing.

Code:

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(2, 3, 4, 5, 6, 7);

int sensorPin = A0; // choose the input pin (for GAS sensor)
int buzzer = 13; // choose the pin for the Buzzer
int G_led = 8; // choose the pin for the Green LED
int R_led = 9; // choose the pin for the Red Led

int read_value; // variable for reading the gaspin status
int set = 280;  // we start, assuming Smoke detected

void setup(){
pinMode(sensorPin, INPUT); // declare sensor as input

pinMode(buzzer,OUTPUT); // declare Buzzer as output
pinMode(R_led,OUTPUT); // declare Red LED as output
pinMode(G_led,OUTPUT); // declare Green LED as output

lcd.begin(16, 2);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("   WELCOME To   ");
lcd.setCursor(0,1);
lcd.print("  GAS Detector  ");
```

```
delay(2000);
lcd.clear();
}

void loop(){
read_value = (analogRead(sensorPin)); // read input value

read_value = read_value - 50;
if(read_value<0){read_value=0;}

lcd.setCursor(0, 0);
lcd.print("Smoke Level: ");
lcd.print(read_value);
lcd.print("  ");

if(read_value>set){ // check if the Smoke variable is High
lcd.setCursor(0, 1);
lcd.print("Alert....!!!    ");
digitalWrite(buzzer, HIGH); // Turn LED on.
digitalWrite(R_led, HIGH); // Turn LED on.
digitalWrite(G_led, LOW); // Turn LED off.
delay(2000);
}
if(read_value<set){ // check if the Smoke variable is Low
lcd.setCursor(0, 1);
lcd.print(".....Normal.....");
```

```
digitalWrite(buzzer, LOW); // Turn LED on.
digitalWrite(R_led, LOW); // Turn LED on.
digitalWrite(G_led, HIGH); // Turn LED on.
}
delay(100);
}
```

Advantages:

1. Early detection of hazardous gases and smoke:
   Gas leak and smoke detectors can detect dangerous levels of gases and smoke early, before they reach levels that are harmful to human health or can cause explosions or fires. This early detection gives lab personnel valuable time to evacuate the lab, call for help, and take other safety measures.
2. Reduced risk of injuries and fatalities:
   By detecting hazardous gases and smoke early, gas leak and smoke detectors can help to reduce the risk of injuries and fatalities from gas leaks, fires, and explosions. This is especially important in labs, where there is often a high concentration of flammable and hazardous materials.
3. Protection of valuable equipment and research:
   Gas leak and smoke detectors can also help to protect valuable equipment and research from damage. Fires and explosions can cause extensive damage to lab equipment and research materials, which can be costly and time-consuming to replace.
4. Peace of mind:
   Knowing that there are gas leak and smoke detectors in place can give lab personnel peace of mind. This can help them to focus on their work without having to worry about the risk of accidents.

Disadvantages:

Cost: Gas leak and smoke detectors can be expensive to purchase and install. They also require regular maintenance and calibration to ensure that they are working properly.

Limitations: Gas leak and smoke detectors are not foolproof. They cannot detect all types of hazardous gases or smoke, and they may not be able to detect gases or smoke that are present in very low concentrations.

Sensitivity: Gas leak and smoke detectors can be sensitive to environmental factors, such as humidity, dust, and temperature. This can lead to false alarms or inaccurate readings.

Need for training: People need to be trained on how to use and maintain gas leak and smoke detectors. This training can be time-consuming and costly.

Maintenance: Gas leak and smoke detectors require regular maintenance and calibration to ensure that they are working properly. This maintenance can be time-consuming and costly.

Limited coverage: Gas leak and smoke detectors can only detect gases or smoke in the area where they are installed. They cannot detect gases or smoke in other areas of the lab.

Discussion:

The Gas Leakage & Smoke Detector project involves the development of a system that aims to detect potential gas leaks and smoke, providing early warnings to prevent hazards and ensure the safety of occupants in residential or commercial spaces. This project has several key points for discussion:

Discussion can revolve around the types of sensors employed in the system to detect gas leaks and smoke. It could cover the working principles of these sensors, their accuracy, limitations, and the overall effectiveness of the technology.

Exploring how the system integrates with other technologies or smart home systems could be a crucial point. Discussing the potential for automation, such as automatic shut-off valves or integration with home security systems, can be significant.

A discussion could highlight the pros and cons of implementing such a system. This involves considering the benefits in terms of safety and the potential drawbacks like false alarms, maintenance needs, or installation challenges.

Evaluating the cost of implementation and the accessibility of such systems is vital. Discussing how to make these systems more affordable and widely available, especially in different economic settings, could be an important consideration.

Emphasizing the importance of regular maintenance and upkeep to ensure the system's proper functioning and the challenges associated with it could be a focal point.

Discussing potential advancements in technology, such as more sensitive sensors, better integration with smart devices, or improvements in early detection, can be intriguing for further research and development.

Considering how to raise awareness about the importance of these systems for public safety and education regarding the risks associated with gas leaks and smoke hazards.

Discussing the environmental implications of gas leaks and fire hazards, as well as how this system can contribute to reducing potential environmental damage, could be an interesting aspect.

The discussion on a Gas Leakage & Smoke Detector project should encompass technological, safety, economic, and social aspects, aiming to enhance safety measures while addressing the challenges and opportunities associated with these systems.