// Arduino project of three sensors [flame (HW-484), Gas LPG (MQ-6) and temperature (DHT11) and three actuators [ water pump, servo motor and buzzer].

#include <DHT.h>

#include <Servo.h>

#define DHT1\_PIN 4  // DHT11 Sensor 1 pin

#define DHT2\_PIN 5  // DHT11 Sensor 2 pin

#define DHT\_TYPE DHT11

#define flamePin 2  // Flame sensor connected to digital pin 2

#define pumpPin 3   // Pump connected to digital pin 3

DHT dht1(DHT1\_PIN, DHT\_TYPE);

DHT dht2(DHT2\_PIN, DHT\_TYPE);

Servo servoMotor;

int buzzerPin = 8;

int sensorPin = A0;

int gasThreshold = 300;

int gasValue;

bool isGasDetected = false;

void setup() {

  Serial.begin(9600);

  dht1.begin();

  dht2.begin();

  servoMotor.attach(9);

  pinMode(buzzerPin, OUTPUT);

  pinMode(flamePin, INPUT);

  pinMode(pumpPin, OUTPUT);

}

void loop() {

  float t1 = dht1.readTemperature();

  float t2 = dht2.readTemperature();

  int flameState = digitalRead(flamePin);

  if (isnan(t1) || isnan(t2)) {

    Serial.println("Failed to read from one or both DHT sensors!");

    return;

  }

  float temperatureDifference = t2 - t1;

  Serial.print("Temperature Sensor 1: ");

  Serial.println(t1);

  Serial.print("Temperature Sensor 2: ");

  Serial.println(t2);

  Serial.print("Temperature Difference: ");

  Serial.println(temperatureDifference);

  gasValue = analogRead(sensorPin);

  Serial.print("Gas Concentration: ");

  Serial.println(gasValue);

  if (gasValue > gasThreshold && !isGasDetected) {

    isGasDetected = true;

    activateAlarm();

  } else if (gasValue < gasThreshold && isGasDetected) {

    isGasDetected = false;

    deactivateAlarm();

  }

  if (flameState == HIGH) {

    digitalWrite(pumpPin, HIGH);  // Turn on the pump if flame is detected

    Serial.print("flame is detected");

  } else {

    digitalWrite(pumpPin, LOW);   // Turn off the pump if no flame is detected

    Serial.print("flame is not detected");

  }

  delay(2000);

}

void activateAlarm() {

  digitalWrite(buzzerPin, HIGH);

  servoMotor.write(90); // Adjust the angle as per your setup

}

void deactivateAlarm() {

  digitalWrite(buzzerPin, LOW);

  servoMotor.write(0); // Adjust the angle as per your setup

}