#include <Wire.h>

#include <LiquidCrystal\_I2C.h>

#include <DHT.h>

// LCD I2C

LiquidCrystal\_I2C lcd(0x27, 16, 2); // LCD I2C address 0x27

// DHT11

#define DHTPIN 2

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

// Sensor Pins

#define MQ135\_PIN A0     // Air Quality Sensor

#define PM25\_PIN  A1     // PM2.5 Sensor

#define RELAY\_PIN 8      // Relay to control fan (Active-Low)

void setup() {

  Serial.begin(9600);

  // LCD init

  lcd.init();

  lcd.backlight();

  lcd.setCursor(0, 0);

  lcd.print(" Smart Purifier ");

  delay(1500);

  lcd.clear();

  // Sensors init

  dht.begin();

  pinMode(RELAY\_PIN, OUTPUT);

  digitalWrite(RELAY\_PIN, HIGH); // Fan OFF initially (HIGH = OFF in active-low relay)

}

void loop() {

  // Read sensors

  float temp = dht.readTemperature();

  float humidity = dht.readHumidity();

  int airQuality = analogRead(MQ135\_PIN);

  int pmValue = analogRead(PM25\_PIN);

  // Show on LCD

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print("T:"); lcd.print(temp);

  lcd.print(" H:"); lcd.print(humidity);

  lcd.setCursor(0, 1);

  lcd.print("PM:"); lcd.print(pmValue);

  lcd.print(" AQ:"); lcd.print(airQuality);

  // Serial debug

  Serial.print("Temp: "); Serial.print(temp); Serial.print(" C, ");

  Serial.print("Humidity: "); Serial.print(humidity); Serial.print(" %, ");

  Serial.print("PM2.5: "); Serial.print(pmValue); Serial.print(", ");

  Serial.print("AirQ: "); Serial.println(airQuality);

  // Fan control logic (corrected)

  if (airQuality > 400 || pmValue > 300) {

    digitalWrite(RELAY\_PIN, LOW);  // Fan ON (Active-Low relay)

  } else {

    digitalWrite(RELAY\_PIN, HIGH); // Fan OFF

  }

  delay(2000);

}