AIR QUALITY MONITORING Phase.1

Problem Definition

Inhaling pollutants for a long time causes damages in human health. Traditional air quality monitoring methods, such as building air quality monitoring stations, are typically expensive This project is suitable for air quality monitoring in real time

Purpose of this project

Air pollution occurs when harmful substances including particulates and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies or death in humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Human activity and natural processes can both generate air pollution

DESIGN OF THINKING

Air is getting polluted because of the release of toxic gases by industries, vehicle emissions and increased concentration of harmful gases and particulate matter in the atmosphere. The level of pollution is increasing rapidly due to factors like industries, urbanization, increase in population, vehicle use which can affect human health. Particulate matter is one of the most important parameters having a significant contribution to the increase in air pollution. This creates a need for measurement and analysis of real-time air quality

monitoring so that appropriate decisions can be taken in a timely period.

In this IoT project, we can monitor the pollution level from anywhere using your computer or mobile.

Components

1. NodeMCU V3
2. DHT11 Sensor
3. MQ-135 Gas Sensor
4. Lcm 1602 iic
5. 16X2 LCD Panel
6. Breadboard
7. Connecting Wires

COMPONENT DESCRIPTION:

NodeMCU**:-**

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 WiFi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting

language. It is based on the eLua project, and built on the Espressif NonOS SDK for ESP8266.

2. DHT11 Sensor (Temperature and humidity sensor)

DHT11 digital temperature and humidity sensor is composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller.

Pin Description:

- 1, the VDD power supply 3.5～5.5V DC
- 2 DATA serial data, a single bus
- 3, NC, empty pin
- 4, GND, used to connect the module to system ground

3. MQ-135 Gas Sensor (Air Quality Sensor)

Air quality click is suitable for detecting ammonia (NH3), nitrogen oxides (NOx) benzene, smoke, CO2 and other harmful or poisonous gases that impact air quality. The MQ-135 sensor

unit has a sensor layer made of tin dioxide (SnO2), an inorganic compound which has lower conductivity in clean air than when polluting gases are present. To calibrate Air quality, use the on-board potentiometer to adjust the load resistance on the sensor circuit.

Pin Description:

- 1, the VDD power supply 5V DC
- 2,GND , used to connect the module to system ground
- 3, DIGITAL OUT, You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer
- 4, ANALOG OUT, This pin outputs 0-5V analog voltage based on the intensity of the gas.

4.Lcm 1602 IIC

Measurement with LCM1602 IIC:

Display: The LCM1602 IIC acts as an output display for the measurements. It can show values from sensors in a readable format. Sensor Integration: To measure air quality and temperature, you would typically connect compatible sensors (like an air quality

sensor and a temperature sensor) to a microcontroller, such as an Arduino or Raspberry Pi

Data Processing: The microcontroller collects data from these

sensors and processes it to obtain air quality and temperature

values. Displaying Data: The processed data is then sent to the LCM1602

IIC module via the I2C communication protocol. The module Receives the data and displays it on its LCD screen.

Pin Description:

The LCM1602 IIC module typically has four pins for connection:

VCC: Connect this pin to a +5V power supply. GND: Connect this pin to ground (0V). SDA (Serial Data): This is one of the two I2C communication pins. Connect it to the SDA pin of your microcontroller. SCL (Serial Clock): This is the second I2C communication pin. Connect it to the SCL pin of your microcontroller. Additionally, there might be potentiometers or buttons on the

Module for adjusting contrast or navigating menus if the module

Supports user interaction.

5.16X2 LCD Panel

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. [1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays.

Pin description

Pin No	Symbol	Level	Description
1	Vss	0 V	Ground
2	V_{DD}	5.0V	Supply voltage for logic
3	V o	variable	Operating voltagefor LCD
4	RS	H/L	H data/L instruction code
5	R/W	H/L	H/Read (MPU-module) L/write (MPU-module)
6	E	H, H-L	Chip enable signal
7	DB0	H/L	Data bit 0
8	DB1	H/L	Data bit 1
9	DB2	H/L	Data bit 2
10	DB3	H/L	Data bit 3
11	DB4	H/L	Data bit 4
12	DB5	H/L	Data bit 5
13	DB6	H/L	Data bit 6
14	DB 7	H/L	Data bit 7
15	A		Power supply for LED backlight (+)
16	K		Power supply for LED backlight (-)

PUBLIC AWARENESS

- To tackle air quality monitoring issues effectively, a multifaceted approach is essential. It begins with reliable data collection, quality control, and real-time monitoring systems. Public awareness and regulatory measures are vital to curb pollution sources. Advanced technology, data analysis, and predictive models provide insights for interventions. Collaboration among stakeholders, international cooperation, and continuous improvement ensure a holistic and proactive response to air quality challenges.

We are using advanced technology for sensing and reducing this type of air pollution