PHASE\_3

NOISE POLLUTION MONITORING

**`1.Identify Sensor Locations:**

* + Identify public areas where noise levels need monitoring, such as parks, busy streets, or event venues.
  + Consider local regulations and guidelines for noise monitoring.

1. **Define Objectives:**
   * Clearly define the objectives of noise monitoring. This could be to assess the impact on public health, enforce noise regulations, or analyze trends over time.

**Technology Selection:**

1. **Choose Noise Sensors:**
   * Select appropriate noise sensors that meet your requirements. Consider factors like accuracy, frequency range, and connectivity options (Wi-Fi, cellular, LPWAN).
2. **Communication Infrastructure:**
   * Decide on the communication infrastructure for the sensors. Options include Wi-Fi, cellular networks, or Low-Power Wide-Area Network (LPWAN) technologies like LoRa or NB-IoT.

**Implementation:**

1. **Power Supply:**
   * Determine the power supply for the sensors. Options include battery power, solar panels, or a combination of both. Ensure that the chosen power source is reliable for continuous operation.
2. **Sensor Deployment:**
   * Install sensors in identified locations. Consider weatherproofing and security measures to protect the sensors from environmental conditions and vandalism.
3. **Connectivity Setup:**
   * Configure the connectivity for the sensors. Ensure that they can transmit data reliably to a central data storage or processing system.
4. **Data Storage and Processing:**

* This could be on a cloud platform or a local server, depending on the scale of your deployment.

**Data Analysis and Visualization:**

1. **Data Analysis Tools:**
   * Implement tools and algorithms for analyzing noise data. This could involve identifying noise trends, peak hours, and compliance with noise regulations.
2. **Visualization Platform:**
   * Develop a user-friendly platform for visualizing the data. Consider creating dashboards that provide real-time information and historical trends.

**Maintenance and Monitoring:**

1. **Maintenance Plan:**
   * Establish a regular maintenance plan to ensure the sensors are functioning correctly. This includes checking the power supply, updating firmware, and replacing faulty sensors.
2. **Security Measures:**
   * Implement security measures to protect the sensors and data from unauthorized access. This is crucial to maintain the integrity and privacy of the collected information.

**Compliance and Communication:**

1. **Regulatory Compliance:**
   * Ensure that your noise monitoring system complies with local regulations and privacy laws.
2. **Public Communication:**
   * Communicate the purpose of the noise monitoring system to the public. Transparency helps build trust and may encourage compliance with noise regulations.

Please note that you need to replace the placeholders (e.g., **YOUR\_SENSOR\_ID**, **YOUR\_API\_KEY**, **API\_ENDPOINT**) with your actual credentials and endpoints.

Python code:

import time

import random

import paho.mqtt.client as mqtt

import requests

# Replace these values with your actual credentials and endpoints

SENSOR\_ID = "YOUR\_SENSOR\_ID"

API\_KEY = "YOUR\_API\_KEY"

API\_ENDPOINT = "https://your-api-endpoint.com/data"

# MQTT Configuration

MQTT\_BROKER = "mqtt.eclipse.org" # Replace with your MQTT broker address

MQTT\_PORT = 1883

MQTT\_TOPIC = "noise\_sensor\_data"

# Simulated Noise Sensor Data

def generate\_noise\_data():

return round(random.uniform(50, 80), 2) # Replace with your actual noise data source

# MQTT Callbacks

def on\_connect(client, userdata, flags, rc):

print("Connected with result code " + str(rc))

client.subscribe(MQTT\_TOPIC)

def on\_message(client, userdata, msg):

noise\_level = float(msg.payload.decode())

print(f"Received noise level: {noise\_level} dB")

# Send data to the API endpoint

send\_data\_to\_api(noise\_level)

def send\_data\_to\_api(noise\_level):

headers = {

"Content-Type": "application/json",

"Authorization": f"Bearer {API\_KEY}",

}

data = {

"sensor\_id": SENSOR\_ID,

"noise\_level": noise\_level,

"timestamp": int(time.time()),

}

try:

response = requests.post(API\_ENDPOINT, json=data, headers=headers)

if response.status\_code == 200:

print("Data sent successfully")

else:

print(f"Failed to send data. Status code: {response.status\_code}")

except Exception as e:

print(f"Error sending data: {str(e)}")

# MQTT Client Setup

mqtt\_client = mqtt.Client()

mqtt\_client.on\_connect = on\_connect

mqtt\_client.on\_message = on\_message

# Connect to MQTT broker

mqtt\_client.connect(MQTT\_BROKER, MQTT\_PORT, 60)

# Start the MQTT loop

mqtt\_client.loop\_start()

try:

while True:

# Simulate noise data and publish to MQTT

noise\_data = generate\_noise\_data()

mqtt\_client.publish(MQTT\_TOPIC, str(noise\_data))

print(f"Published noise level: {noise\_data} dB")

time.sleep(5) # Adjust the interval based on your requirements

except KeyboardInterrupt:

print("Script terminated by user.")

mqtt\_client.disconnect()

Explanation:

* The script uses the **paho.mqtt.client** library for MQTT communication. Install it using **pip install paho-mqtt**.
* Replace the placeholders (**YOUR\_SENSOR\_ID**, **YOUR\_API\_KEY**, **API\_ENDPOINT**, etc.) with your actual values.
* The **generate\_noise\_data** function simulates the noise level data. Replace it with the actual function or sensor data source.
* The script subscribes to an MQTT topic (**noise\_sensor\_data**) to receive real-time noise data.
* Upon receiving the data, the script sends it to the specified API endpoint using an HTTP POST request.