**NOISE POLLUTION MONITORING**

***Description:***

According to a WHO report half of India live in noisy surroundings and one third of Indians experience sleep disturbances due to traffic noise.

● One fifth of indians are regularly exposed to sound levels at night that could significantly damage health.

● There should be a system which shall monitor the noise coming from railways and other sources of noise .

● Noise maps are based on numerical calculations and having display to give good measures of long term averaged noise level.

● However ,these maps does not take into account the variation of noise levels, temporary construction work, emergency vehicles, squeak from hanging brakes on trains etc.

***Sensors:***

1. **Microphones:**

These are the primary sensors for capturing sound levels. Electret condenser microphones are often used in IOT noise monitoring devices due to their sensitivity and small size.

1. **Sound Level Meters (SLMs):**

These are specialized sensors designed for measuring noise levels. They often include a microphone and signal processing circuitry to calculate sound levels in decibels (dB).

1. **Vibration Sensors:**

Noise can also manifest as vibrations. Accelerometers or piezoelectric sensors can detect these vibrations and help in assessing noise pollution.

1. **Environmental Sensors:**

These sensors measure additional environmental parameters like temperature, humidity, and air quality. These factors can provide context for noise pollution data.

1. **GPS Sensors:**

GPS modules can be integrated to record the location of noise sources, which can be useful for mapping noise pollution hotspots.

1. **Internet Connectivity:**

IoT devices need internet connectivity, so sensors are often paired with Wi-Fi, cellular, or other communication modules to transmit data to a central server or cloud platform.

1. **Data Processing and Analysis:**

Noise data collected by these sensors is sent to a central server or cloud platform for storage and analysis. Machine learning algorithms can be employed to identify patterns and trends in noise pollution.

1. **Power Source:**

To ensure continuous monitoring, IoT noise pollution devices require a stable power source, which can be batteries, solar panels, or wired power connections.

1. **Enclosures:**

To protect the sensors from environmental factors and vandalism, the devices are often enclosed in weather-resistant and tamper-proof cases.

1. **User Interface:**

A user interface, often in the form of a web or mobile app, allows users to access and interpret the collected noise pollution data.

**Project Steps :**

The project steps remain consistent with the previous outline. Here is how the sensors are integrated into the process

**Project Planning**:

Define the scope, objectives, budget, and timeline for the project.

**Select IoT Devices with Sensors:**

Research and choose IoT devices that include the necessary sensors.

**Deployment of IoT Devices**:

Install IoT devices with sensors noise pollution monitoring system and at key infrastructure locations.

**Data Collection:**

IoT devices with sensors will collect data using Environmental sensor, vibration sensor, GPS sensor, sound level meters, etc. .

**Data Processing and Storage:**

Develop a data processing pipeline to clean and store the collected sensor data.

***Python code:***

import paho.mqtt.client as mqtt

import sound\_sensor\_module # Replace with your sensor module

# MQTT Broker Configuration

broker\_address = "mqtt.example.com"

port = 1883

topic = "noise\_data"

# Initialize the MQTT client

client = mqtt.Client("NoiseSensor")

client.connect(broker\_address, port)

while True:

# Read noise data from the sensor

noise\_level = sound\_sensor\_module.read\_noise\_level()

# Publish the data to the MQTT topic

client.publish(topic, str(noise\_level))

# Add error handling and other necessary features