Noise Pollution Monitoring using IoT

Phase-2 Document submission

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Project: Monitoring environmental noise pollution.

Phase-2: Design Thinking and Innovation

Introduction:

» Noise pollution is a pervasive environmental issue that can have detrimental effects on human health, wildlife, and the overall quality of life in urban and industrial areas. To effectively address and mitigate noise pollution, real-time monitoring and data collection are essential. This is where Internet of Things (IoT) devices play a crucial role.

» IoT devices are interconnected sensors and devices that collect and transmit data over the internet. When applied to noise pollution monitoring, IoT devices offer a cost-effective, scalable, and efficient solution.

Contents of Phase-2:

This section make our project design into innovation to solve the problem and gives the plans in steps which are going to be used in the project and the steps are follows,

» **IoT Sensors:** IoT noise pollution monitoring systems consist of specialized sensors designed to capture sound levels and patterns in the environment. These sensors are equipped with microphones and data processing capabilities.

» **Data Collection:** The IoT sensors continuously capture audio data from their surroundings. This data includes information about the amplitude, frequency, and duration of noise events.

» **Data Processing:** In-built processors within the IoT sensors analyze the collected audio data in real-time. This processing can involve identifying noise sources, measuring sound levels in decibels (dB), and categorizing noise events based on their characteristics (e.g., traffic noise, industrial machinery, or aircraft).

» **Data Transmission:** Processed data is transmitted wirelessly to a central data hub or server via the internet. IoT devices can use various communication protocols, such as Wi-Fi, cellular networks, or LoRa (Long Range), depending on the application and location.

» **Data Analysis and Visualization:** Noise pollution data is analyzed using specialized software and algorithms. This analysis can reveal patterns, trends, and areas of concern, helping policymakers and environmentalists make informed decisions. Visualizations, such as maps and charts, can be created to convey information effectively.

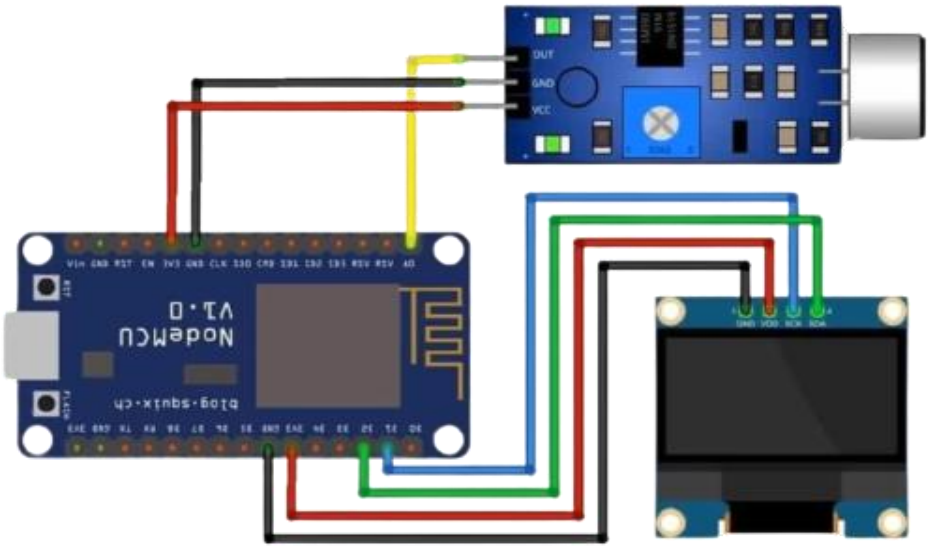
» **Device Compatibility:** It **e**nsure that the web application is responsive and accessible on various devices, including smartphones , tablets and laptops for wider accessibility.

» **Alerts and Notifications:** IoT noise monitoring systems can be configured to send alerts and notifications in real-time when noise levels exceed predefined thresholds. This feature is valuable for immediate response and compliance monitoring.

» **Accessibility:** Data collected by IoT noise pollution monitoring devices is accessible to a wide range of stakeholders, including government agencies, researchers, city planners, and the general public. Open data initiatives can promote transparency and community engagement in addressing noise pollution issues.

» **Urban Planning and Policy Implementation:** Noise pollution data collected by IoT devices can inform urban planning decisions, zoning regulations, and noise control policies. It enables city planners to identify noise hotspots, evaluate the effectiveness of noise abatement measures, and make evidence-based decisions to improve the acoustic environment.

Circuit Diagram for Iot noise meter:



Pseudo-code for noise monitoring:

Initialize OLED display

Define soundSensorPin as A0
Define noiseThreshold as 500
Define currentNoiseLevel as 0

Initialize Wi-Fi connection
Connect to Wi-Fi network with SSID "yourSSID" and password "yourPassword"

Set up timer to update display every 1 second

Loop:
    Read noise level from sound sensor (analogRead)
    Map sensor value to a 0-100 range (currentNoiseLevel = map(sensorValue, 0, 1023, 0, 100))

    Handle timer tasks (timer.run())

UpdateDisplay:
    Clear the OLED display

    Display "Noise Level:" at position (0, 0)
    Display currentNoiseLevel at position (0, 20) with " dB"

    If currentNoiseLevel is greater than noiseThreshold:
        Display "Above Threshold!" at position (0, 50) in red

    Update the OLED display

End Loop

Conclusion:

In conclusion, noise pollution monitoring using IoT devices offers a powerful solution to address the challenges posed by excessive noise in our urban and industrialized environments. By leveraging real-time data collection and analysis, IoT technology empowers communities and authorities to take proactive measures to reduce noise pollution and improve the quality of life for residents.