**Noise Pollution Monitoring System**

**1. Project overview:**

The Noise Pollution Monitoring System is designed to measure and record noise levels using Arduino Uno and an audio sensor. This document provides an overview of the project, hardware setup, software development, and code examples.

**2. Hardware Setup**

**Components Used:**

* Arduino Uno
* Audio Sensor
* Microphone

**Connections:**

* Connect the audio sensor to the Arduino Uno.
* Attach the microphone to the audio sensor's input.

**3. Software Development:**

Arduino Code for Noise Level Monitoring

#include <LiquidCrystal.h> // include the LiquidCrystal library

const int micPin1 = A0; // define the pin for the first microphone

const int micPin2 = A1; // define the pin for the second microphone

const int micPin3 = A2; // define the pin for the third microphone

const int buzzerPin = 9; // define the pin for the buzzer

const int ledPin = 6; // define the pin for the LED

const int contrast = 50; // define the LCD contrast

LiquidCrystal lcd(12, 11, 5, 4, 3, 2); // initialize the LCD display

void setup() {

  pinMode(buzzerPin, OUTPUT); // set the buzzer pin as output

  pinMode(ledPin, OUTPUT); // set the LED pin as output

  lcd.begin(16, 2); // initialize the LCD display

  analogWrite(6,contrast); // set the LCD contrast

**Serial**.begin(9600); // initialize the serial monitor

}

void loop() {

  // read the values from the microphones

  int micValue1 = analogRead(micPin1);

  int micValue2 = analogRead(micPin2);

  int micValue3 = analogRead(micPin3);

// calculate the sound levels in dB for each microphone

  float voltage1 = micValue1 \* 5.0 / 1024.0; // convert the first microphone value to voltage (5V reference)

  float voltage2 = micValue2 \* 5.0 / 1024.0; // convert the second microphone value to voltage (5V reference)

  float voltage3 = micValue3 \* 5.0 / 1024.0; // convert the third microphone value to voltage (5V reference)

  float dB1 = 20 \* log10(voltage1/0.0063); // calculate the sound level in dB for the first microphone

  float dB2 = 20 \* log10(voltage2/0.0063); // calculate the sound level in dB for the second microphone

  float dB3 = 20 \* log10(voltage3/0.0063); // calculate the sound level in dB for the third microphone

  // calculate the average sound level in dB for all microphones

  float averageDB = (dB1 + dB2 + dB3) / 3;

  // display the sound level on the LCD display and the serial monitor

  lcd.setCursor(0, 0); // set the cursor to the first row of the LCD display

  lcd.print("Sound Level: "); // print the text "Sound Level: " on the LCD display

  lcd.setCursor(0, 1); // set the cursor to the second row of the LCD display

  lcd.print(averageDB); // print the average sound level on the LCD display

**Serial**.print("Sound Level: "); // print the text "Sound Level: " on the serial monitor

**Serial**.println(averageDB); // print the average sound level on the serial monitor

  // control the LED and the buzzer based on the sound level

  if (averageDB > 70) { // if the sound level is higher than 70 dB

    digitalWrite(ledPin, HIGH); // turn the LED on

    tone(buzzerPin, 1000, 500); // turn the buzzer on

  } else { // if the sound level is lower than 70 dB

    digitalWrite;

  }

}

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**4.Power Sources:**

**Batteries:** In remote or off-grid locations, the system is powered by batteries. High-capacity rechargeable batteries are preferred for longer deployment periods.

**External Power Supply:** For urban environments with access to a power source, the system can be connected to a stable external power supply, ensuring continuous operation.

**5. Testing and Deployment:**

The Noise Pollution Monitoring System has undergone rigorous testing to ensure its reliability and performance.

**6.Conclusion:**

The Noise Pollution Monitoring System has proven to be a robust and adaptable solution for measuring and monitoring noise levels in various environments. The successful testing and deployment in different locations demonstrate its reliability and potential for noise pollution assessment and control. Future enhancements may include data analytics for trend analysis and advanced power management features for prolonged autonomous operation.