**IBM NAAN MUDHALVAN PROJECT**

**PROJECT TITLE: NOISE POLLUTION MONITORING**

**COLLEGE NAME: PERI INSTITUTE OF TECHNOLOGY**

**DOMAIN: INTERNET OF THINGS (IOT)**



**Submitted By**

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**PHASE 3:**

**OBJECTIVE:**

This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issu**es**

**OUTLINE OF THE PROJECT:**

Various study reports have highlighted the increase in noise pollution levels across the city during festivals and non-festival days in four zones — residential, commercial, industrial, and silence



Pune: The Maharashtra Pollution Control Board’s (MPCB) project to set up three ambient noise pollution monitoring systems in Pune, approved in May, is yet to take off.

MPCB plans to install 36 new real-time ambient noise monitors in urban areas across the state this year. (HT PHOTO)MPCB plans to install 36 new real-time ambient noise monitors in urban areas across the state this year, under Phase-II of the Centre’s National Ambient Noise Monitoring Network.Various study reports have highlighted the increase in noise pollution levels across the city during festivals and non-festival days in four zones — residential, commercial, industrial, and silence.

The 2017 National Environmental Engineering Research Institute (NEERI) noise level survey covering Pune, carried out with the support of MPCB, highlighted that it has risen above the standards set by the Central Pollution Control Board (CPCB). The report underlined the need to prepare an action plan for noise pollution in the city.

CPCB in 2019 came up with a programme to set up 24-hour automatic ambient noise pollution system network across the country. In the first phase, the systems were set up at various locations across Mumbai by MPCB. The second phase included putting up 36 new monitoring sites in the state at sites namely residential, commercial, industrial, and “silence” zones, including three in Pune. Pratap Jagtap, former sub-regional officer, MPCB Pune, said, “While the authorities had decided Shivajinagar as one of the locations for setting up the system, nothing has been finalised yet.”

**IMPLEMENTATION OF DEVICES BASED ON PYTHON SCRIPT:**

Working Explanation: The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases, so it is perfect gas sensor for our noice Quality Monitoring Project. When we will connect it to Arduino then it will sense the gases, and we will get the Pollution level in PPM (parts per million)

* Passive Infrared (PIR) Sensors
* Ultrasonic sensors
* Microcontroller based sensors
* Temperature sensors

As per a particular source, the fifteen most utilized sensor types in IoT comprise the following: Passive Infrared (PIR), Ultrasonic, Pressure, Level, Temperature, Humidity, Gas, Light (Optical), Motion (PIR and Microwave), Magnetic Field (Hall Effect), Smoke/Fire, Flow/Velocity, pH Sensor, Water Quality Sensor, and ...etc

**DEVICES AND COMPONENTS:**

Important **IOT devices** are,

* PIR- passsive infrared sensor:

A **passive infrared sensor** (**PIR sensor**) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

All objects with a temperature above absolute zero emit heat energy in the form of electromagnetic radiation. Usually, this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose



**Connections:**

* Pin1 corresponds to the drain terminal of the device, which connected to the positive supply 5V DC.
* Pin2 corresponds to the source terminal of the device, which connects to the ground terminal via a 100K or 47K resistor. The Pin2 is the output pin of the sensor. The pin 2 of the sensor carries the detected IR signal to an amplifier from the
* Pin3 of the sensor connected to the ground

2.Arduino nano:

Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL serial (5V) communication, which is available on digital pins 0 (RX) and 1 (TX).



An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino firmware) provide a virtual com port to software on the computer

**SENSORS USED:**

These sensors are used in the project as an innovative part which consists of,

* **Occupancy Sensors:**

Type: Passive Infrared (PIR) or Ultrasonic

Specification: Detects motion to determine restroom occupancy.

* **Water Usage Sensors:**

Type: Flow Sensors or Pressure Sensors

Specification: Measures water flow to monitor usage and detect leaks.

* **Air Quality Sensors:**

Type: Multi-sensor modules (e.g., CO2, humidity, temperature)

Specification: Monitors air quality, temperature, and humidity.

* **Toilet Flush Sensors:**

Type: Ultrasonic, Infrared, or Pressure Sensors

Specification: Detects flushing to monitor maintenance needs.

* **Paper and Soap Dispenser Sensors:**

Type: Infrared or Ultrasonic Sensors

Specification: Monitors dispensing and sends alerts for refills.

* **Waste Bin Sensors:**

Type: Ultrasonic sensors

Specification: Monitors waste bin fill levels.

**PYTHON PROGRAM:**

In a real implementation, we would use IoT sensors to collect real data. The details will be Replaced by placeholders with actual platform details. The simulated data with actual sensor readings are replaced from IoT devices (PIR sensor) installed in your restroom. In a real IoT implementation, we would use physical sensors like PIR and an actual IoT platform to transmit real data.

import http.client

import json

import random

import time

# Define the endpoint URL and payload

platform\_host = "your-restroom-platform-api.com"

platform\_path = "/data"

while True:

# Simulate sensor data (0 for vacant, 1 for occupied, and cleanliness on a scale of 0-10)

occupancy = random.choice([0, 1])

cleanliness = random.uniform(0, 10)

# Create a JSON payload

sensor\_data = {

"occupancy": occupancy,

"cleanliness": cleanliness

}

try:

# Establish a connection to the platform

conn = http.client.HTTPSConnection(platform\_host)

# Prepare headers

headers = {"Content-Type": "application/json"}

# Send a POST request with the payload

conn.request("POST", platform\_path, json.dumps(sensor\_data), headers)

response = conn.getresponse()

if response.status == 200:

print("Data sent successfully:", sensor\_data)

else:

print("Failed to send data. Status code:", response.status)

conn.close()

except Exception as e:

print("Error:", e)

# Simulate data transmission every 10 seconds (adjust as needed)

time.sleep(10)

**EXPLANATION:**

* An IoT-based air and sound pollution monitoring system is implemented using a network of sensors, connectivity technologies, and data analytics platforms.
* Noise pollution are among the most important problems and challenges in urban environments. Noise can cause several problems in functioning within urban settlements and may result in a variety of health problems.
* Noise can cause several problems in functioning within urban settlements and may result in a variety of health problems.
* It creates a JSON payload (sensor\_data) containing the occupancy and cleanliness data.
* It sends a POST request to the platform with the JSON payload.
* It checks the response status code. If the status code is 200, it prints a success message. Otherwise, it prints an error message.
* The script then waits for 10 seconds before sending the next data . Noise can cause several problems in functioning within urban settlements and may result in a variety of health problems.
* packet. You can adjust this sleep duration as needed.