

AIR QUALITY MONITORING

INTRODUCTION :

Air quality monitoring involves the measurement and assessment of various pollutants and gases in the atmosphere to determine the quality of the air. This is typically done to ensure public health and environmental safety. Various sensors and instruments are used to monitor factors such as particulate matter (PM_{2.5}, PM₁₀), gases like nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ozone (O₃), carbon monoxide (CO), and volatile organic compounds (VOCs). Real-time data from monitoring stations is often used to inform the public, regulators, and policymakers about air quality conditions. It plays a crucial role in managing air pollution and its impact on human health and the environment.

OBJECTIVES :

- **Protecting Public Health:** Monitoring air quality helps identify pollution levels and potential health risks. It allows for timely warnings and interventions to protect people from exposure to harmful pollutants.

- **Environmental Protection:** Assessing air quality is essential for safeguarding ecosystems and wildlife by monitoring the impact of pollutants on vegetation, water bodies, and soil.
- **Regulatory Compliance:** Monitoring ensures that industries and entities adhere to air quality regulations and standards set by environmental agencies. This helps in enforcing emission limits and reducing environmental harm.
- **Research and Analysis:** Monitoring provides data for scientific research and analysis, allowing a better understanding of air pollution sources, trends, and their consequences.
- **Policy Development:** Policymakers use air quality data to create and modify regulations aimed at reducing pollution and improving

- **Public Awareness:** Air quality data informs the public about the quality of the air they breathe, empowering individuals to make informed decisions about outdoor activities and health protection measures.
- **Emergency Response:** Real-time monitoring aids in responding to air quality emergencies, such as industrial accidents or natural disasters that release hazardous pollutants into the atmosphere.
- **Long-term Trends:** Monitoring allows tracking of long-term air quality trends, helping to measure the effectiveness of pollution control measures and evaluate progress in reducing pollution levels.

Overall, air quality monitoring serves to improve air quality, protect public health, and reduce the environmental impact of pollution.

SENSORS USED:

Air Quality Sensors: These are the primary devices used to measure specific pollutants, including particulate matter (PM2.5, PM10), gases like nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), carbon monoxide (CO), and volatile organic compounds (VOCs).

PYTHON SCRIPT:

```
import time

import random # Simulating sensor data

# Initialize your air quality sensor (replace with your sensor
library)

class AirQualitySensor:

    def __init__(self):

        pass

    def read_data(self):

        # Simulating sensor data, replace with actual sensor
        readings

        return {

            'PM2.5': random.uniform(0, 50),

            'PM10': random.uniform(0, 100),

            'CO': random.uniform(0, 5),

            'NO2': random.uniform(0, 2),
```

```
'SO2': random.uniform(0, 1),
'O3': random.uniform(0, 0.2),
'Temperature': random.uniform(10, 30),
'Humidity': random.uniform(20, 70)
}

def main():
    air_sensor = AirQualitySensor()
    while True:
        # Read air quality data from the sensor
        air_quality_data = air_sensor.read_data()
        # Print the data (you can replace this with data storage or
analysis)
        print("Air Quality Data:")
        for param, value in air_quality_data.items():
            print(f'{param}: {value}')
```