**Problem Statement :**

Develop an IoT-based environmental monitoring system to collect real-time data on air quality, temperature, humidity, and pollution levels in urban areas, enabling proactive environmental management and improving public health .

**Design Thinking**

1. **Project Objectives :**

* Real-time data collection (air quality, temperature, humidity, pollution).
* Reliable IoT data transmission.
* Data processing and trend analysis.
* User-friendly data visualization.
* Critical pollution level alerts.
* Informed urban environmental management.
* Public awareness.
* Scalability.
* Compliance.
* Continuous improvement.

1. **Iot Devices Designs :**

* Air quality sensors (e.g., PM2.5, PM10, NO2, CO)
* Temperature sensor
* Humidity sensor
* Pollution level sensors
* Microcontroller/Processor (e.g., Arduino, Raspberry Pi)
* Connectivity Module (e.g., Wi-Fi, cellular, LoRaWAN)
* Power supply (battery or renewable energy source)
* Data processing capabilities
* Security features (encryption, authentication)
* Weather-resistant enclosure
* Remote management capabilities
* Energy efficiency features
* Firmware and software

1. **Environmental Monitoring platform :**

* Data Storage
* Data Processing and Analytics
* User Interface (Dashboard)
* Alerting System
* Security Features
* APIs for Integration
* Scalability
* Data Visualization
* Compliance and Reporting
* Geospatial Integration
* User Management
* Data Backup and Recovery
* API Documentation
* Performance Monitoring
* Continuous Improvement Mechanisms
* IoT Device Integration
* Cloud/Server Infrastructure
* Data Privacy Compliance

1. **Integration Approach :**
2. IoT devices collect data and transmit it to a central server.
3. Data is ingested, processed, and stored securely.
4. Real-time analysis detects critical pollution levels.
5. An alerting system notifies users and authorities.
6. A user-friendly dashboard displays data.
7. Robust security and APIs ensure data access.
8. Scalability and backup mechanisms are in place.