Developing an IoT-based air quality monitoring system :

1. *Define Requirements*:
   Determine what pollutants (e.g., particulate matter, CO2, VOCs).
   Decide the location and scale of your monitoring system (indoor, outdoor, city-wide).

2. *Choose Sensors*:

   - Consider sensors' accuracy, power consumption, and calibration requirements.

3. **Microcontroller and Communication:**
   - Choose a microcontroller (e.g., Arduino, Raspberry Pi) to interface with sensors.
   - Integrate communication modules (Wi-Fi, Bluetooth, LoRa) for data transmission.

4. *Connectivity and IoT Platform:**
   - Establish a connection to the internet using the communication module.
   - Choose an IoT platform (like AWS IoT, Azure IoT, or ThingSpeak) to store and manage data.

5. **Data Visualization:**
   - Develop a web or mobile application to visualize the air quality data.
   - Implement real-time charts, graphs, and alerts for users to monitor air quality.

6. *Data Analysis and Machine Learning* :
   - Implement algorithms for data analysis, trend prediction, or anomaly detection.
   - Use machine learning techniques to predict air quality based on historical data.

7. *User Interface and Notifications*:
   - Design a user-friendly interface displaying air quality information.
   - Implement notifications (email, SMS) for users when air quality crosses predefined thresholds.

8. *Power Management*:
   - Implement power-saving mechanisms to prolong the device's battery life (if applicable).

9. *Testing and Deployment*:
    - Test the system in various environmental conditions to ensure accuracy and reliability.
    - Deploy the monitoring devices in the target locations.

10. *Maintenance and Updates*:
    - Plan for regular maintenance to calibrate sensors and ensure accurate readings.
    - Provide over-the-air updates for software improvements and bug fixes

Program:

```javascript
// Importing the necessary modules if you're using Node.js
const axios = require('axios');

// Replace 'YOUR_API_KEY' with your actual OpenWeatherMap API key
const apiKey = 'YOUR_API_KEY';
const city = 'New York'; // Replace with the city you want to monitor

const apiUrl = `https://api.openweathermap.org/data/2.5/weather?q=${city}&appid=${apiKey}`;

axios.get(apiUrl)
  .then(response => {
    const airQuality = response.data.main.aqi;
    console.log(`Air Quality in ${city}: ${getAirQualityStatus(airQuality)}`);
  })
  .catch(error => {
    console.error('Error fetching air quality data:', error);
  });

function getAirQualityStatus(aqi) {
  // AQI scale: 1 (Good) to 5 (Hazardous)
  switch (true) {
    case aqi <= 50:
      return 'Good';
    case aqi <= 100:
      return 'Moderate';
    case aqi <= 150:
      return 'Unhealthy for Sensitive Groups';
    case aqi <= 200:
      return 'Unhealthy';
    case aqi <= 300:
      return 'Very Unhealthy';
    default:
      return 'Hazardous';
  }
```

```
}
```