Project Title: IoT Air Quality Monitoring System

Components Needed:

Air Quality Sensors: You’ll need sensors to measure various air quality parameters, such as particulate matter (PM2.5 and PM10), carbon dioxide (CO2), volatile organic compounds (VOCs), temperature, humidity, and air pressure. Sensors like the Bosch BME680, SDS011, or Plantower PMS5003 can be used.

Microcontroller: Choose a microcontroller to process sensor data and send it to a server or cloud. Common options are Arduino, Raspberry Pi, or ESP8266/ESP32 for Wi-Fi connectivity.

Internet Connectivity: You’ll need Wi-Fi or another connectivity option to transmit data to the cloud. For Wi-Fi, ESP8266/ESP32 modules are a good choice. You could also use cellular modules or LoRa for remote areas.

Cloud Platform: Use a cloud platform like AWS, Google Cloud, or Azure to store and analyze the data. These platforms provide tools for data processing and visualization.

Data Visualization: Create a web or mobile application to display real-time air quality data. You can use web development technologies like HTML, CSS, and JavaScript for this.

Power Supply: Depending on the deployment location, you may need a battery or solar power source for the IoT device.

Project Steps:

Sensor Setup: Connect the air quality sensors to the microcontroller, calibrate them, and write code to read data from the sensors.

Microcontroller Configuration: Set up the microcontroller with the appropriate libraries and firmware to process sensor data.

Connect to the Cloud: Program the microcontroller to send data to the chosen cloud platform over Wi-Fi or another network.

Cloud Data Storage: Configure the cloud platform to receive and store the data. Set up databases for data storage.

Data Analysis: Implement data analysis algorithms to process and interpret sensor data. For example, you can calculate Air Quality Index (AQI) values.

Data Visualization: Create a web or mobile app that connects to the cloud platform to display real-time air quality data in an understandable format.

Alert System: Implement an alert system to notify users or authorities if air quality falls below a certain threshold.

Power Management: Ensure the system can operate for extended periods by optimizing power usage and considering backup power sources if necessary.

Deployment: Install the monitoring system in the target location, making sure it is weatherproof and secure.

Maintenance: Regularly update the system’s firmware and replace sensors as needed.