المدرســـة العليـــا للمواصــلات بتونـس
Ecole Supérieure des Communications de Tunis
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Design Document
AIR-AWARE: Indoor Air Quality Intelligent Surveillance System

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1 General Overview

Maintaining healthy indoor air quality has become a crucial concern as people spend most of their time indoors. Poor air quality can cause discomfort, health problems, and lower productivity. Traditional air monitoring systems are often costly and lack real-time intelligence, which limits their effectiveness in detecting anomalies or providing timely alerts.

The AIR-AWARE system is designed as an intelligent IoT-based platform that continuously monitors and analyzes indoor air quality. By integrating sensor networks, cloud processing, and artificial intelligence, it offers real-time data visualization, predictive analysis, and instant notifications to help users maintain a healthy indoor environment.

The system's main functionalities include:

- Real-time air quality monitoring: Tracks CO2, VOCs, temperature, humidity, and particulate matter (PM2.5/PM10).

- Threshold-based alerts: Sends notifications when pollutant levels exceed safety limits.

- Predictive analysis: Uses AI models to forecast potential air quality deterioration.

- Location tracking via LBS: Maps air quality variations across different indoor areas.

- Interactive dashboard: Provides real-time visualization, historical data, and personalized recommendations.

Through these features, AIR-AWARE promotes health, safety, and comfort in residential, educational, and professional spaces.
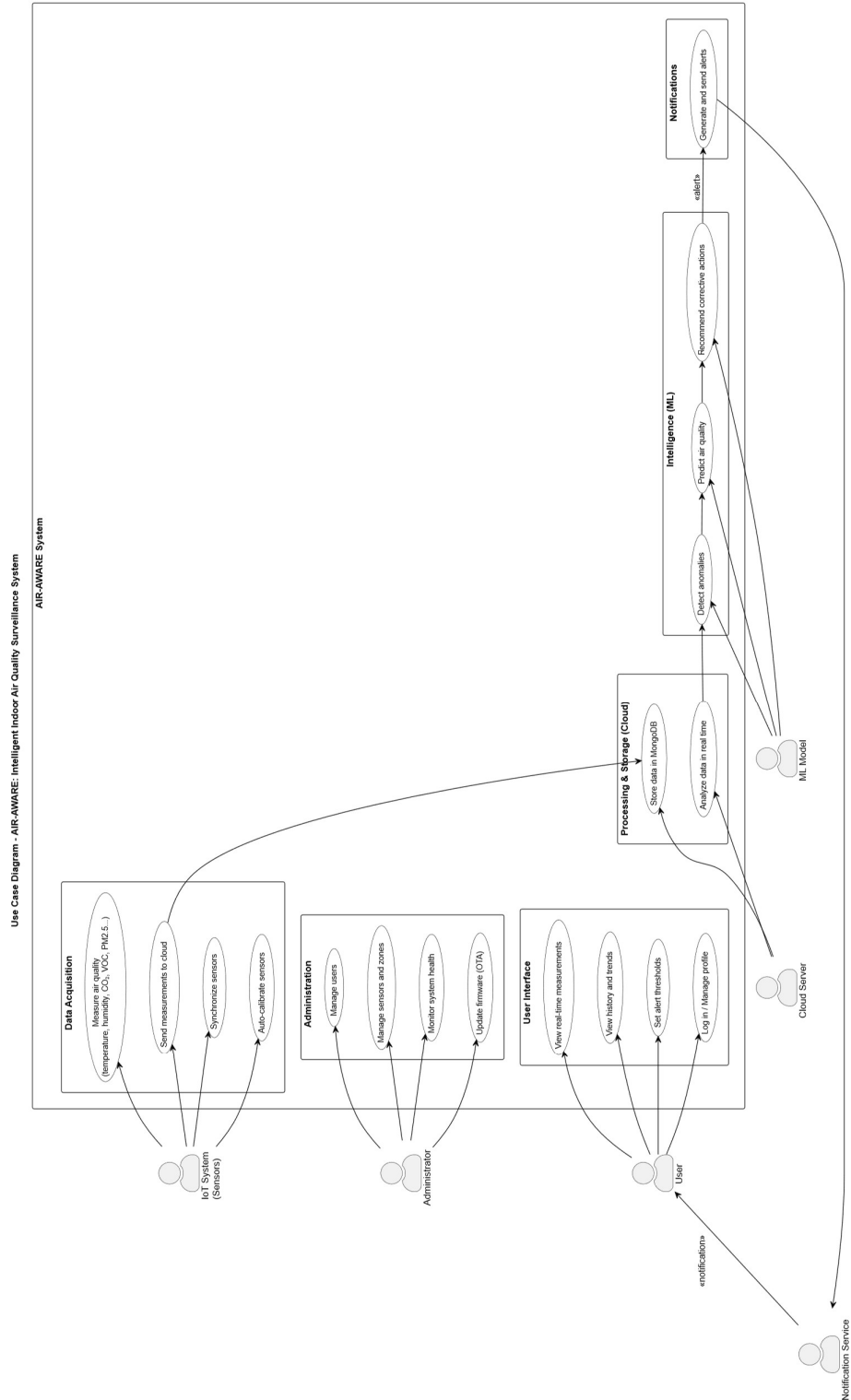
2 Use Case Diagram

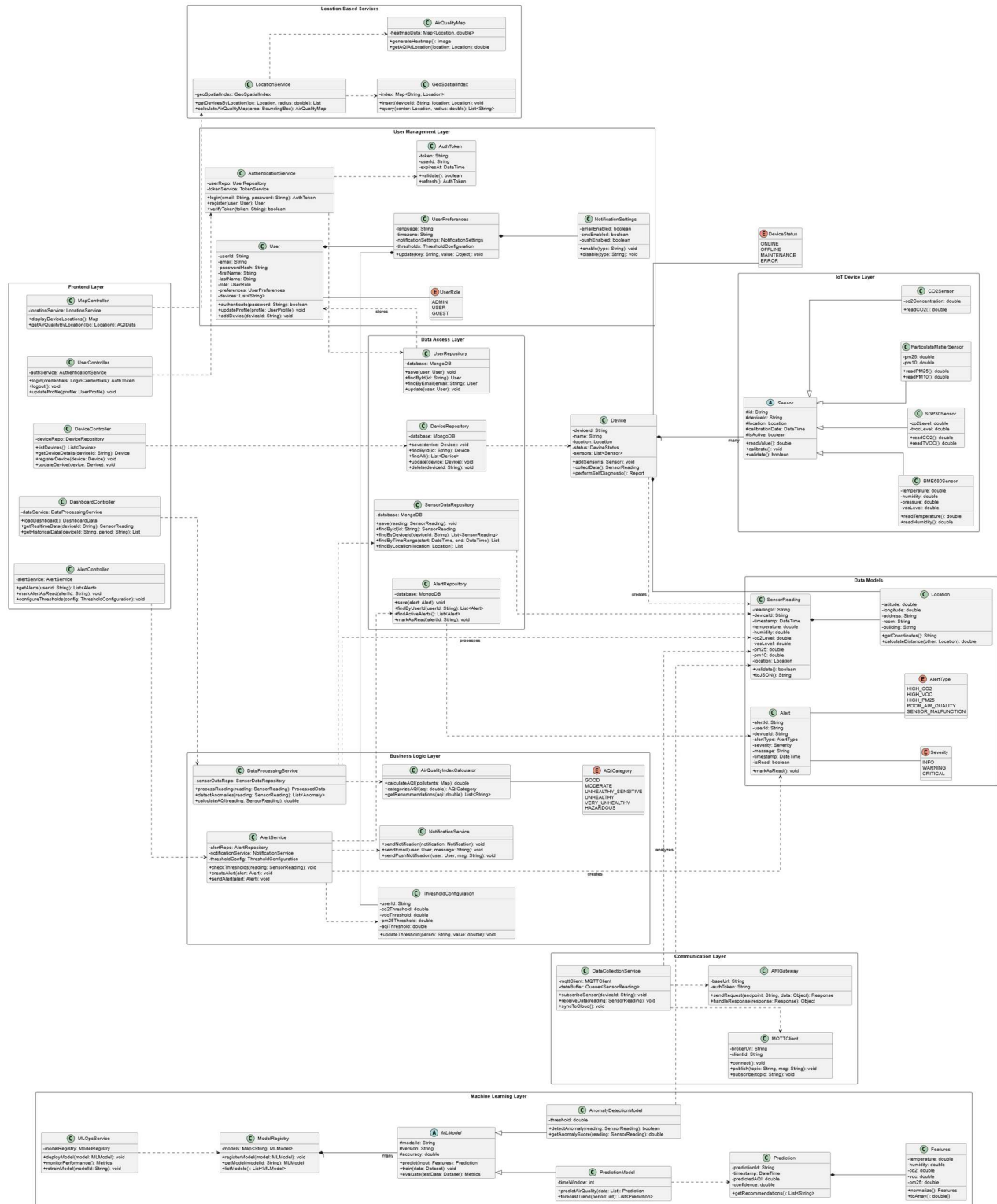*Figure 1: AIR-AWARE Use Case Diagram (Landscape)*

3 Class Diagram

Figure 2: AIR-AWARE Class Diagram

4 Sequence Diagrams

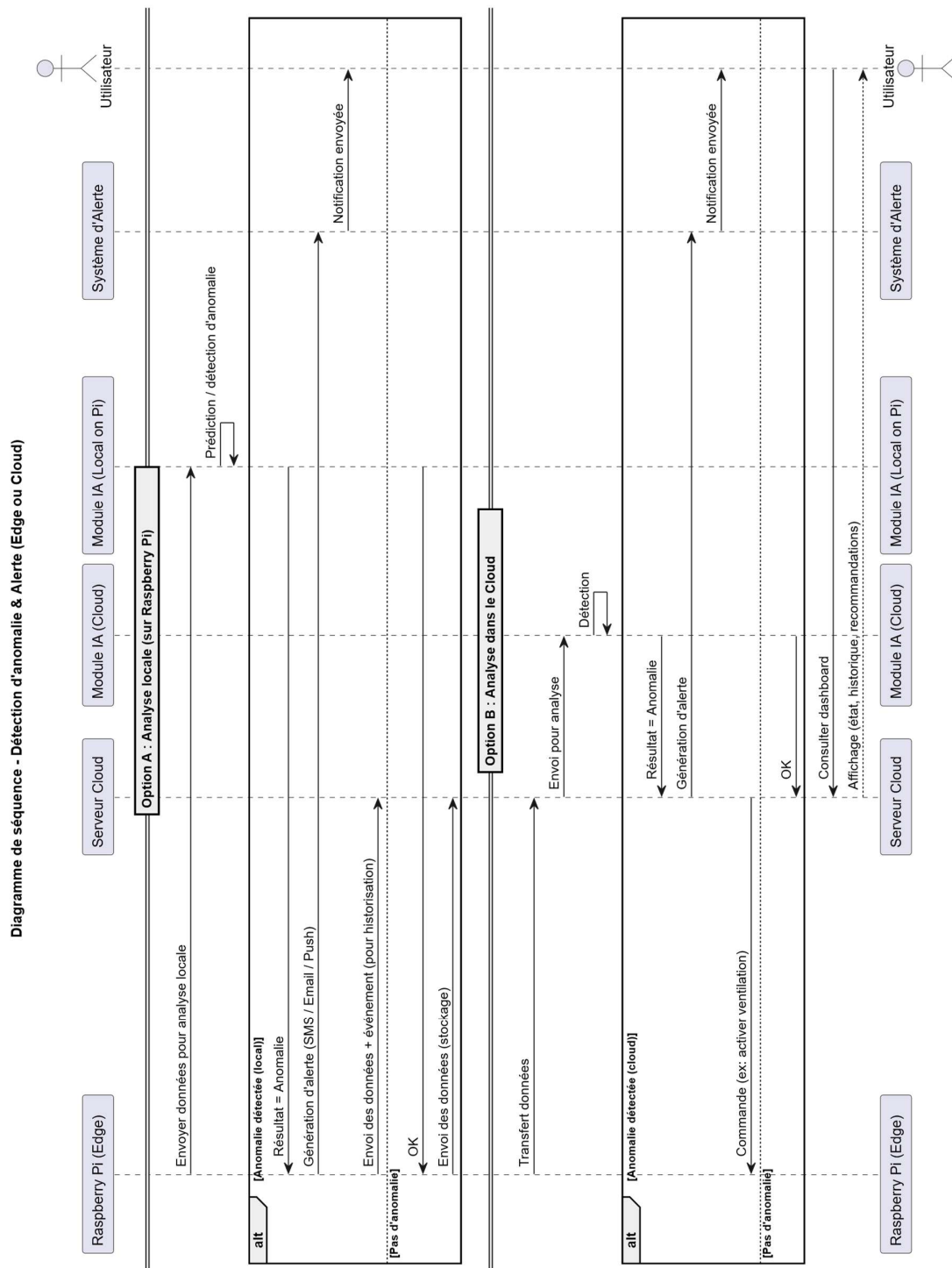## 4.1 Data Collection and Transmission (Raspberry Pi)

Figure 3: Sequence Diagram – Data Collection and Transmission
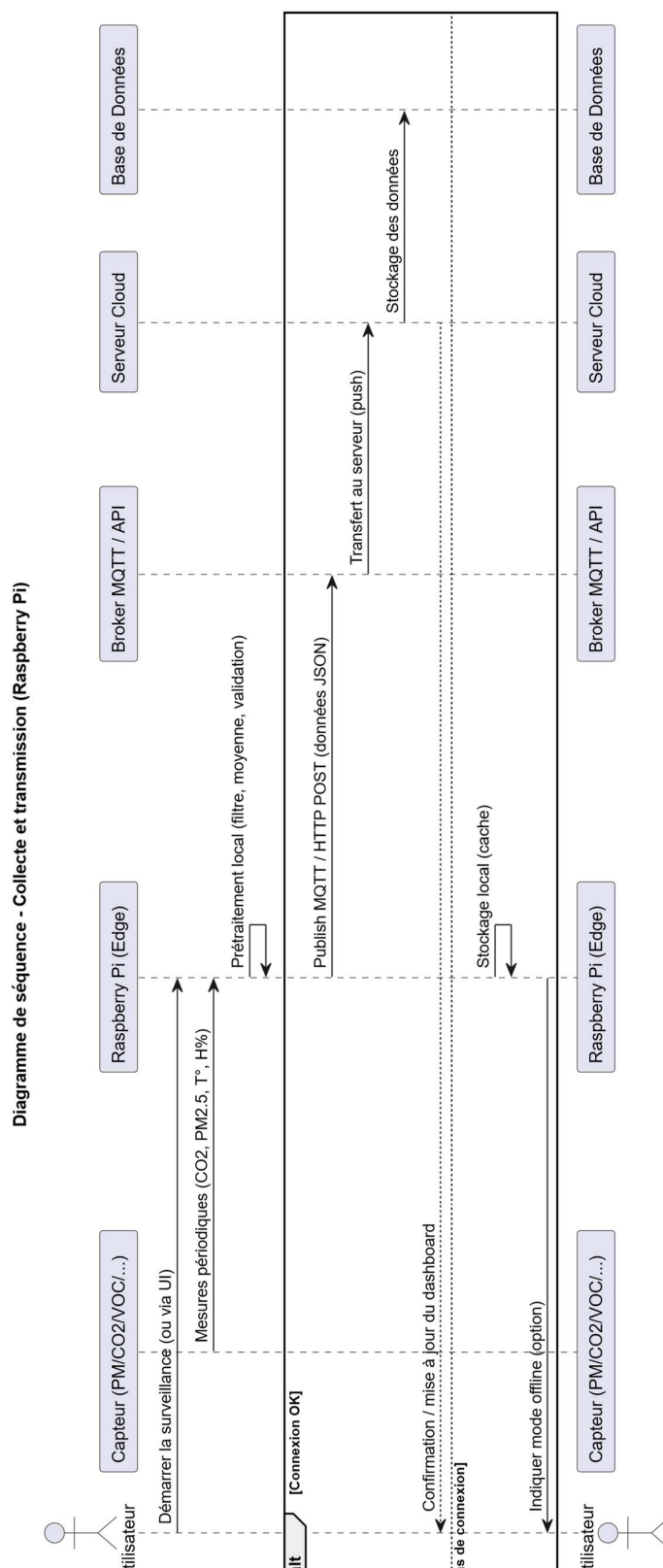
4.2 Anomaly Detection and Alerts (Edge and Cloud)
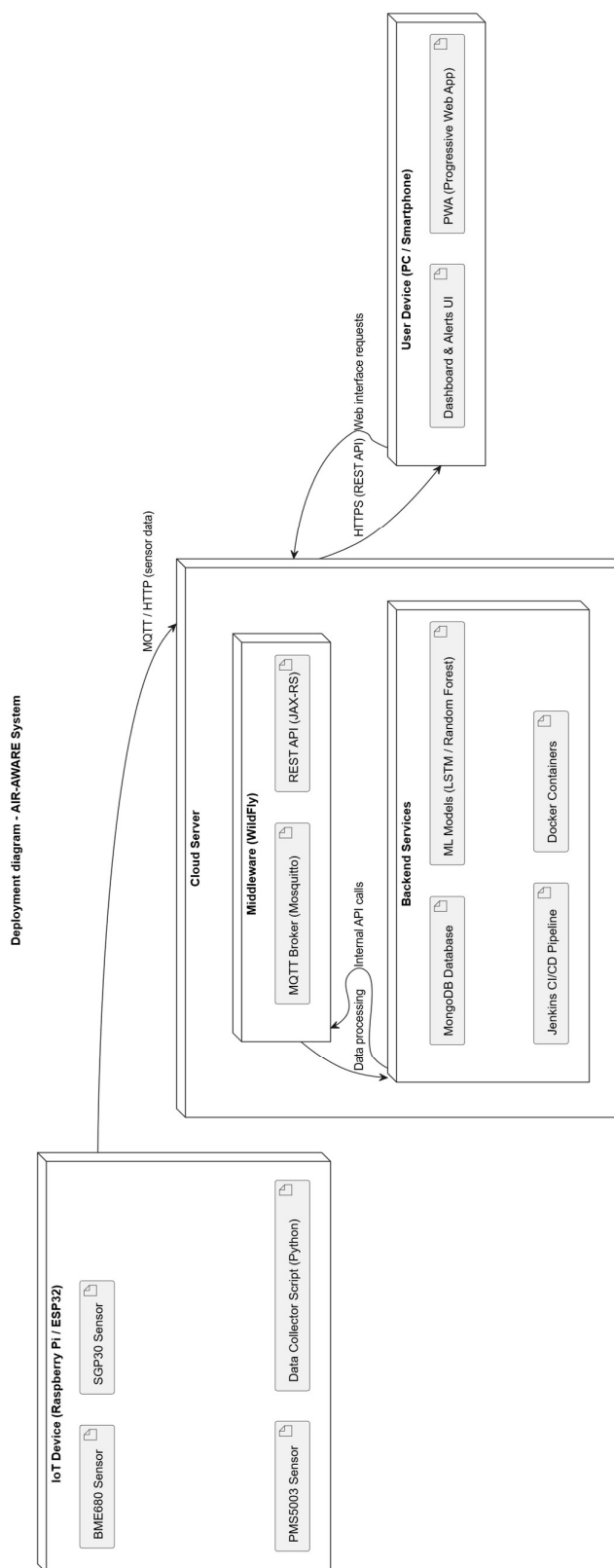

Figure 4: Sequence Diagram – Anomaly Detection and Alerts

5 Deployment Diagram

Figure 5: AIR-AWARE Deployment Diagram