

**Project Design Phase**  
**Solution Architecture**

Date	29 June 2025
Team ID	LTVIP2025TMID33805
Project Name	Sustainable Smart City Assistant Using IBM Granite LLM
Maximum Marks	4 Marks

**Solution Architecture:**

The architecture of the **Sustainable Smart City Assistant** combines a responsive frontend, modular backend, and powerful AI services to deliver real-time sustainability insights and citizen support. The platform integrates multiple smart city features such as KPI forecasting, anomaly detection, policy query answering, and eco-friendly recommendations, all powered by IBM Granite LLM.

**1. Frontend**

Streamlit – For building the web-based user interface with sidebar navigation and page routing.

Matplotlib / Seaborn / Plotly – For displaying KPI graphs and visual insights.

**2. Backend**

FastAPI – For creating RESTful API endpoints to handle logic and communication with frontend and AI services.

**3. AI & NLP**

IBM Watsonx Granite LLM – For chat assistant, eco tips generation, policy summarization, and sustainability report generation.

LangChain + langchain\_ibm – For integrating IBM Granite LLM and managing prompt templates.

**4. Analytics**

Scikit-learn (Linear Regression) – For KPI forecasting.

Manual logic (threshold-based) – For anomaly detection based on user-entered KPI values.

## 5. Security & Configuration

.env file (dotenv) – For managing and protecting API keys securely.

## 6. Deployment

Localhost – Running the entire project locally for testing and demo purposes.

This architecture ensures flexibility, modularity, and real-time interaction for smart city users while leveraging the power of IBM Granite LLM to make urban environments more sustainable and AI-enabled.

### Example - Solution Architecture Diagram:

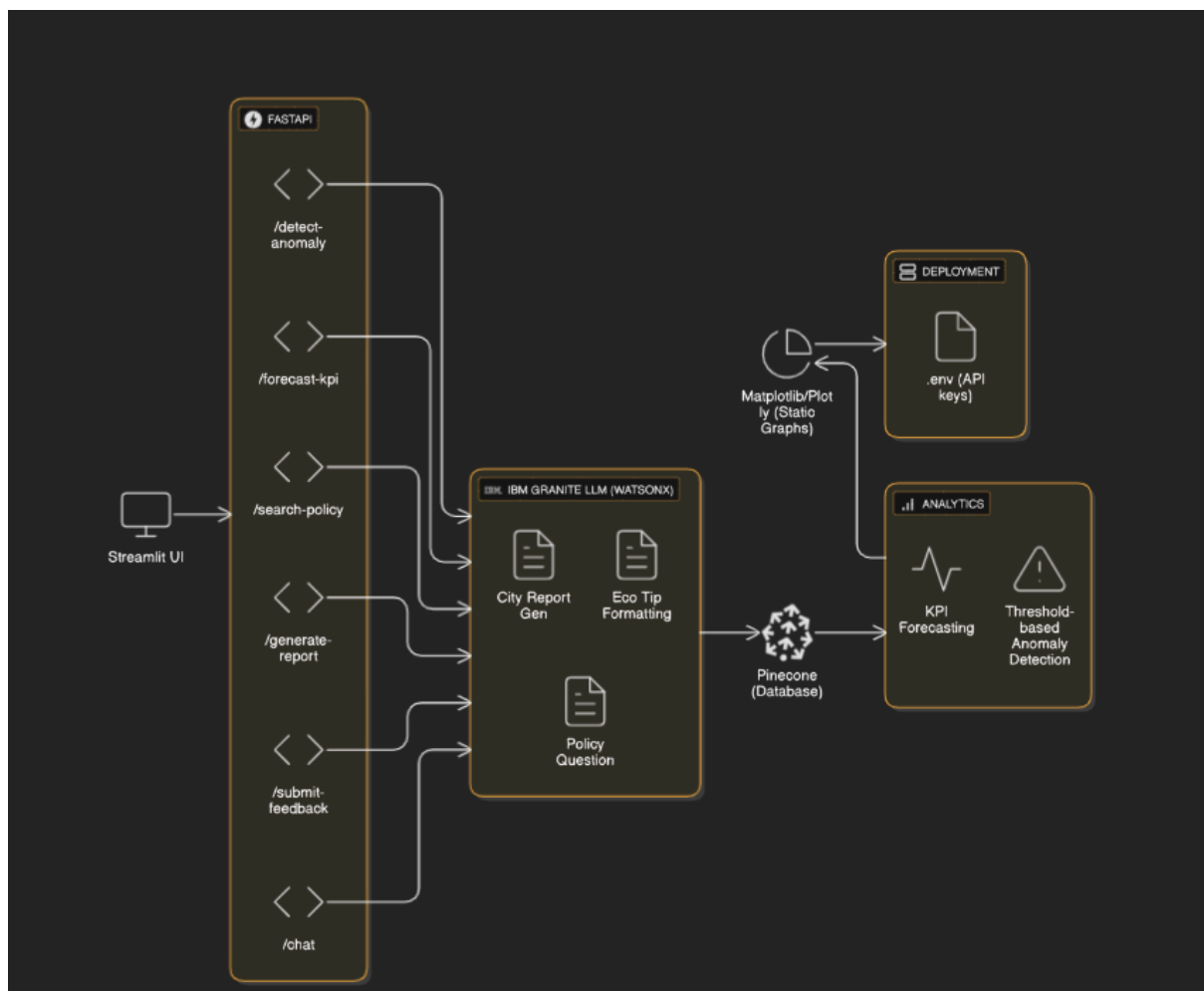


Figure 1: Architecture and data flow of the voice patient diary sample application

#### Reference:

<https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/>

