Project Documentation

Project Title: Sustainable Smart City Assistant Using IBM Granite LLM

1. Introduction

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2. Project Overview

Purpose:
The purpose of a Sustainable Smart City Assistant is to empower cities and their residents to thrive in a more eco-conscious and connected urban environment...

3. Architecture

Frontend (Streamlit): Interactive web UI with dashboards, file uploads, chat, feedback forms, and reports.
Backend (FastAPI): Provides REST APIs for processing.
LLM Integration: Uses IBM Watsonx Granite.
Vector Search: Pinecone for semantic search.
ML Modules: Forecasting & anomaly detection.

4. Setup Instructions

Prerequisites: Python 3.9+, pip, API keys.
Installation: Clone repo, install requirements, configure .env, run FastAPI + Streamlit.

5. Folder Structure

app/ – Backend logic
app/api/ – API routes
ui/ – Streamlit frontend
smart_dashboard.py – Dashboard entry
granite_llm.py – LLM integration
document_embedder.py – Embeddings
kpi_file_forecaster.py – Forecasts
anomaly_file_checker.py – Anomaly detection
report_generator.py – Sustainability reports

6. Running the Application

Run FastAPI backend, start Streamlit dashboard, upload docs/CSVs, interact with assistant.

7. API Documentation

POST /chat/ask
POST /upload-doc
GET /search-docs
GET /get-eco-tips
POST /submit-feedback

8. Authentication

Options include JWT, OAuth2, role-based access, and IBM Cloud credentials.

9. User Interface

Sidebar navigation, KPI visualizations, tabbed layouts, real-time handling, report download.

10. Testing

Unit Testing, API Testing, Manual Testing, Edge Case Handling.