Project Design Phase-II

Technology Stack (Architecture & Stack)

Date	27 June 2025
Team ID	LTVIP2025TMID21127
Project Name	Sustainable Smart City Assistant
Maximum Marks	4 Marks

Technical Architecture:

The deliverable includes the architectural diagram and the following tables which explain the components and technologies used in the system, as well as its technical characteristics.

Reference: https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/

Table-1 : Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web interface for user interaction	Streamlit
2	Application Logic-1	PDF upload, parsing, summarization	Python, PyPDF2, FLAN-T5
3	Application Logic-2	Semantic embedding and vector search	sentence-transformers, FAISS / Pinecone
4	Application Logic-3	Chatbot for sustainability queries	Prompt engineering with Hugging Face
5	Database	Storage of user reports, tips	Local JSON/CSV or SQLite
6	Cloud Database	Semantic vector storage	Pinecone
7	File Storage	Uploaded PDFs and KPI data	Local filesystem
8	External API-1	Optional: Weather	OpenWeatherMap

		or policy APIs	(planned)
9	External API-2	Optional: Civic info APIs	GovData APIs (future)
10	Machine Learning Model	Forecasting and anomaly detection	scikit-learn (Linear Regression, Isolation Forest)
11	Infrastructure	Local app deployment	Localhost / can be scaled to cloud

Table-2 : Application Characteristics

S.No	Characteristics	Description & Technology
1	Open-Source Frameworks	Streamlit, Hugging Face Transformers, FAISS, scikit-learn
2	Security Implementations	File type validation, API key security (future extension), local-only access
3	Scalable Architecture	Modular design with independent AI, DB, and frontend layers
4	Availability	Easily deployable on cloud or multiple servers if needed
5	Performance	Fast API calls, embeddings caching possible, optimized search using FAISS/Pinecone

References:

https://c4model.com/
https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/
https://www.ibm.com/cloud/architecture
https://aws.amazon.com/architecture
https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d