Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	27 June 2025
Team ID	LTVIP2025TMID32124
Project Name	Sustainable Smart City Assistant using IBM Granite LLM
Maximum Marks	4 Marks

Technical Architecture:

This project utilizes **LLM-based intelligence** (IBM Granite 3.3-2b-instruct) to build a **smart city assistant** accessible via a web UI. It allows users to enter eco-queries or civic complaints in plain language, which are interpreted and responded to by the model

Example: Real-time Civic Complaint Handling

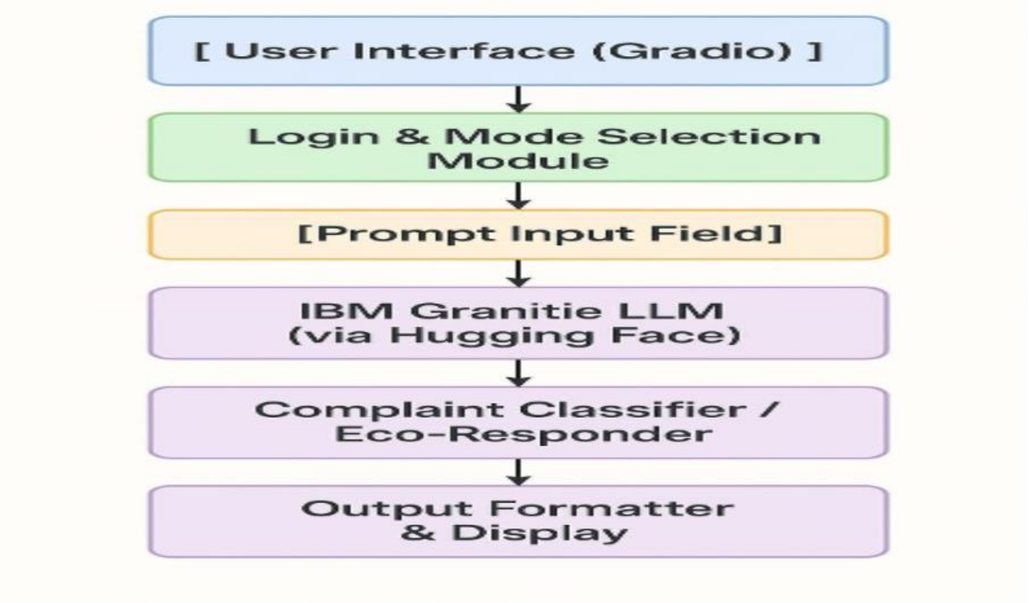
[User Interface (Gradio)]
Login & Mode Selection Module
[Prompt Input Field]
IBM Granitie LLM (via Hugging Face)
Complaint Classifier / Eco-Responder
Output Formatter & Display

Table-1 : Components & Technologies:

S. No	Component	Description	Technology
1	User Interface	Web UI interface allowing users to enter queries and complaints via text UI framework)	Flask
2	Application Logic-1	Handles prompt formatting, login logic, and validation	Python
3	Application Logic-2	Keyword-based complaint classification and department routing	Python
4	Application Logic-3	LLM-based processing of civic and eco queries	IBM Granite 3.3-2b-instruct (Hugging Face)
5	Database		J Python Dictionaries (Temporary)

		No permanent storage used, but structured prompt-response handling via in-memory Python logic	
6	Cloud Database	Can be integrated with IBM Cloudant or Firebase for logging complaints (future enhancement)	IBM Cloudant (optional/future)
7	File Storage	Local script and temporary memory used; PDF/image input planned in future	Local Filesystem (currently)
8	External API-1	Future plan: Integrate IBM Weather API to handle environment-based queries	IBM Weather API (future scope)
9	External API-2	Optional: Integration with Aadhaar API for identity validation during complaint submission	Aadhar API (optional/future)
10	Machine Learning Model	Uses a pre-trained LLM to understand and respond to user inputs	IBM Granite LLM (via Hugging Face)
1	Infrastructure (Server / Cloud)	Deployed via Google Colab	Cloud: Hugging Face / Colab / Local

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1	Open-Source Frameworks	Uses open-source libraries and platforms for development and deployment	Python, flask .Colab, Hugging Face Transformers
2	Security Implementations	Basic login-based access control; in future: OAuth or JWT token-based authentication	SHA-256 (planned), Secure Login in Flask
3	Scalable Architecture	Modular script (main.py) supports adding new modes/APIs; scalable to microservices	2-Tier (UI + Model Logic); can evolve to 3-Tier
4	Availability	Hosted on cloud platforms like Hugging Face/Colab for 24x7 access	Hugging Face Spaces / Google Colab