**PROJECT DESIGN DOCUMENTATION**

**Introduction:**

This project leverages the IBM Granite AI model to provide two major functionalities:

1. City Analysis: Offers insights on crime index and accident/traffic safety data for a given city.

2. Citizen Services: Acts as a government assistant to answer citizen queries about public services, policies, and civic issues.

The system is designed with a user-friendly web interface using Gradio, enabling easy interaction for citizens and administrators.

**Objectives:**

Provide AI-powered analysis of city safety data.

Enable citizen-government interaction through natural language queries.

Design a scalable, interactive web application that can be extended with additional services in future.

**System Design:**

1.High-Level Architecture:

Frontend/UI: Gradio web interface with two functional tabs:

City Analysis Tab

Citizen Services Tab

Backend/AI Engine:

Hugging Face transformers library

IBM Granite (granite-3.2-2b-instruct) for natural language understanding and response generation

Execution Environment:

PyTorch for model inference

Runs locally with CPU/GPU support

Can be deployed on cloud platforms or Hugging Face Spaces

2.Workflow:

City Analysis

1. User inputs a city name.

2. System generates a structured AI prompt requesting:

Crime Index

Safety statistics

Accident/traffic safety information

3. AI model processes the prompt and generates a textual report.

Citizen Interaction

1. User submits a query about services/policies.

2. AI generates a helpful and contextual response in the role of a government assistant.

**Functional Components:**

Component Description

Tokenizer Converts input text into tokens understood by the Granite model.

Model Loader Loads the Granite LLM with GPU/CPU auto-configuration.

Response Generator Handles AI text generation with sampling & decoding strategies.

City Analysis Module Constructs prompts for city safety data queries.

Citizen Services Module Constructs prompts for government-related queries.

Gradio Interface Provides interactive UI with tabs, textboxes, and output areas.

**User Interface (UI) Design:**

Home Page Title: City Analysis & Citizen Services AI

Tab 1 – City Analysis:

Input: Textbox (city name)

Output: Text/Markdown (crime & accident analysis)

Tab 2 – Citizen Services:

Input: Textbox (user query)

Output: Text/Markdown (government response)

**Technical Considerations:**

Performance:

Model size (2B parameters) may be slow on CPU; GPU preferred.

Scalability:

Can be extended with additional modules (e.g., healthcare, education, transport).

Data Reliability:

Responses are AI-generated, not real statistical data. Must be paired with verified sources in production.

Deployment:

Easy deployment with Hugging Face Spaces or local server hosting.

**Future Enhancements:**

Integrate real-time government/city datasets for accurate statistics.

Add multilingual support for broader citizen accessibility.

Enable speech-to-text and text-to-speech for accessibility.

Implement admin dashboards for monitoring citizen queries.