Sustainable Smart City Assistant

Project Documentation

1. Introduction

Project Title: Sustainable Smart City Assistant

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2. Project Overview

Purpose:

The purpose of Sustainable Smart City Assistant is to support city sustainability, governance, and citizen engagement using AI-powered tools. By integrating IBM Granite models, this assistant can provide instant eco-friendly suggestions, summarize city-related documents, track sustainability progress, and gather citizen feedback in real time.

It ultimately helps city administrators, policymakers, and citizens to collaborate effectively, ensuring that urban growth is eco-conscious, data-driven, and citizen-friendly.

Features:

1. City Health Dashboard

Key Point: Real-time sustainability tracking

Functionality: Displays energy usage, water conservation, waste management, and air quality metrics for cities.

2. Citizen Feedback System

Key Point: Community-driven governance

Functionality: Collects, analyzes, and summarizes citizen suggestions/complaints for better decision-making.

3. Document Summarizer

Key Point: Smart content analysis

Functionality: Summarizes lengthy government documents, reports, or policies into simple and actionable insights.

4. Eco Tips Generator

Key Point: AI-driven sustainability advice

Functionality: Provides quick tips on energy saving, water conservation, waste reduction, and green lifestyle practices.

5. Interactive UI (Gradio)

Key Point: User-friendly dashboard

Functionality: Provides a clean interface for administrators and citizens to interact with AI tools.

3. Architecture

Frontend (Gradio):

Built using Gradio, offering an interactive web-based UI.

Includes dashboard, citizen feedback form, and document summarizer interface.

Provides direct access to sustainability insights in a simple, visual, and interactive way.

Backend (Hugging Face + Granite Model):

Backend powered by IBM Granite models hosted on Hugging Face.

Handles text summarization, eco tips generation, and citizen feedback analysis.

Integrated into Google Colab for development and execution.

Development Environment (Google Colab):

Application runs on Google Colab with T4 GPU support.

Allows easy prototyping and deployment with all dependencies installed using pip.

4. Setup Instructions

Prerequisites:

Python 3.9 or later

pip package manager

Hugging Face account

IBM Granite models access

Gradio Framework

Steps:

1. Open Google Colab and create a new Python file.

2. Install dependencies:

pip install transformers torch gradio

3. Sign up in Hugging Face → search for IBM Granite models → select a model.

4. Configure your Hugging Face/IBM Granite API key in Colab or .env.

5. Import libraries and load the Granite model.

6. Launch the Gradio interface from Colab.

7. Click on the generated URL to open the Sustainable Smart City Assistant app.

5. Folder Structure

Since this project runs mainly in Colab, all logic is combined into a single script.

Sustainable_Smart_City_Assistant.py

```
├── Gradio Frontend
│   ├── Dashboard (City Health, Eco Tips)
│   ├── Citizen Feedback UI
│   ├── Document Summarizer

├── Backend Logic
│   ├── IBM Granite model integration
│   ├── Text summarization & eco tips functions

├── Configuration
│   ├── Hugging Face / IBM API key
│   ├── Library imports

└── Utilities
    ├── Input handling
    ├── AI response management
```

6. Running the Application

1. Open Google Colab → Create Sustainable_Smart_City_Assistant.py.

2. Install libraries (transformers, torch, gradio).

3. Add IBM Granite / Hugging Face API key.

4. Run notebook cells → A Gradio link will appear.

5. Click link → Open the app.

Interact with modules like:

City Health Dashboard (energy, water, waste data).

Eco Tips Generator (“Suggest eco tips for water conservation”).

Document Summarizer (upload city policy PDFs).

Citizen Feedback System (enter public complaints/suggestions).

7. API Documentation

Since the project runs inside Gradio, backend APIs are not separately exposed. All functionalities are accessible via the Gradio interface.

Core Functions:

1. City Health Dashboard

Input: City data (manual or preloaded).

Output: Visualized sustainability metrics.

2. Citizen Feedback

Input: Citizen text feedback.

Output: AI-generated insights and summaries.

3. Document Summarizer

Input: Upload text/PDF documents.

Output: Simplified summary.

4. Eco Tips Generator

Input: Sustainability domain (energy/water/waste).

Output: AI-generated eco-friendly tips.

1. Eco Tips Generator

Input: Environmental Problem/Keywords

Output: Sustainable Living Tips

2. Policy Summarization

Input: Policy document text

Output: Policy Summary & Key Points

Idhu oda meaning → neenga Eco-Friendly Guidance + Governance Support ah cover panreenga.
💡 This makes your project look practical + professional.

Ippo naan unga documentation la UI section update panni kudukken:

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8. User Interface

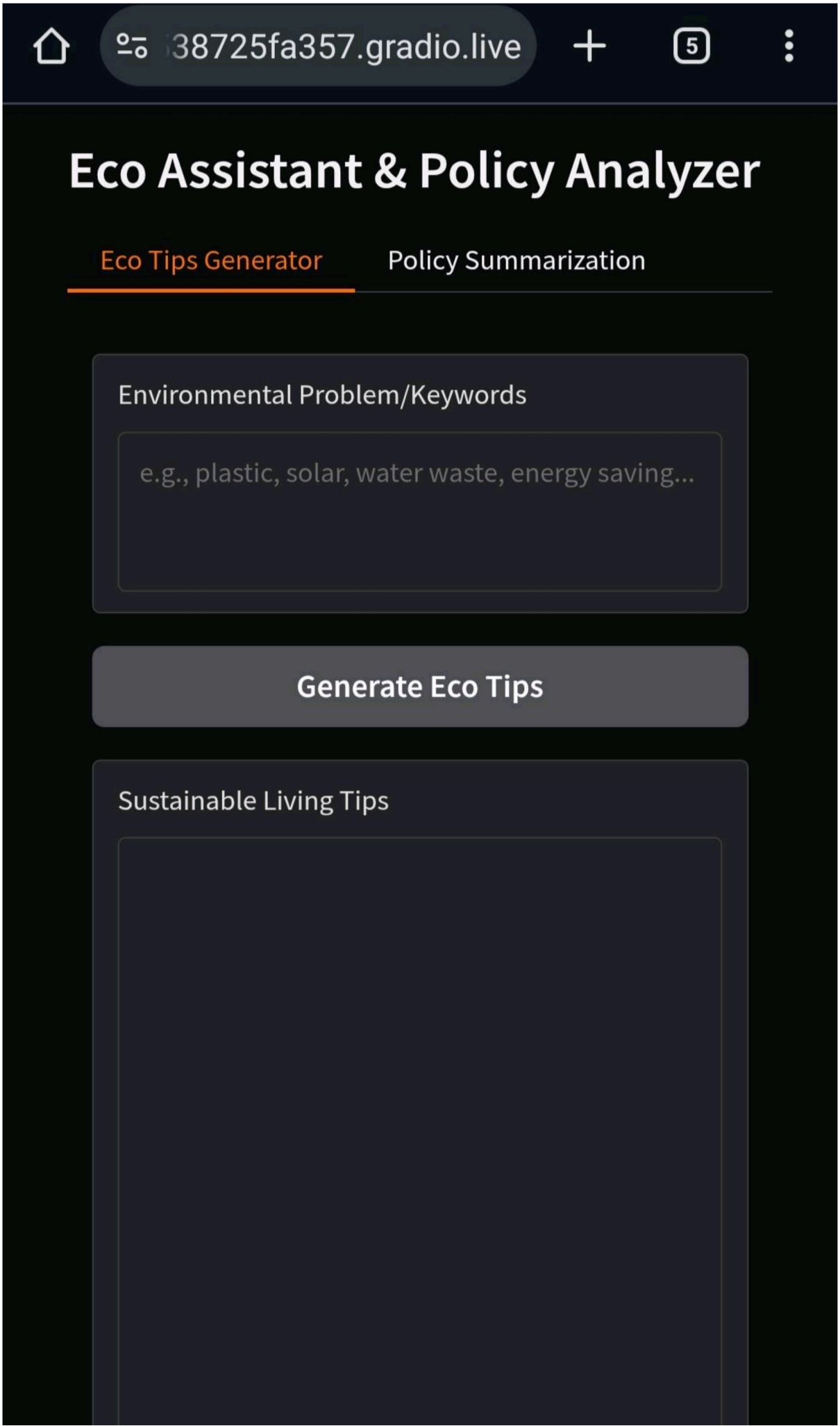
The Gradio-based UI of Sustainable Smart City Assistant contains two main modules:

1. Eco Tips Generator

Input: User enters environmental issues/keywords (e.g., plastic, solar energy, water waste).

Process: IBM Granite model generates eco-friendly solutions.

Output: Sustainable lifestyle tips are displayed in the result box.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5
Eco Assistant & Policy Analyzer
Eco Tips Generator
Policy Summarization
Environmental Problem/Keywords
e.g., plastic, solar, water waste, energy saving...
Generate Eco Tips
Sustainable Living Tips

2. Policy Summarization

Input: User pastes policy or governance-related text.

Process: Granite model summarizes content into clear and actionable points.

Output: Policy Summary & Key Points are shown in the output panel.

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Eco Assistant & Policy Analyzer

Eco Tips Generator | Policy Summarization

Or paste policy text here

Paste policy document text...

Summarize Policy

Policy Summary & Key Points