Citizen Ai : Intelligent Citizen Engagement Platform.

Generative Ai with IBM

Project Documentation:

1.Introduction:

- **Project title** : Citizen Ai: Intellident Citizen Engagement platform.
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- **Team member:** Dhanalakshmi T
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2.Project Overview:

Citizen Ai is an intelligent , Ai-driven civic engagement platform designed to bridge the gap between citizens and government services. The project intergrates Python,Hugging Face Transformars,Gradio,and the IBM Granite model to provide a modern web-bassed assistant that delivers accurate, real-time, and context-aware responses.

The system begins with a secure authendication flow where users first sigh up and then log in gain access. This ensures personalized interaction and allows future extensions like user-specific dashboards. Once logged in, users are presented with a clean homepage interface styled with a modern UI design, which introduces CitizenAI’s capabilities.

- Core Features:

1. Home Page – A central hub that explains CitizenAI’s purpose, key features, and provides a user-friendly layout with text and visuals to guide citizens.

2. City Analysis – Provides a detailed assessment of any city by generating insights into crime index, safety statistics, traffic conditions, and accident rates, enabling users to understand the safety profile of their environment.

3. Citizen Services – Functions as a virtual government assistant, answering queries related to public services, policies, and civic issues. This feature helps users access clear, simplified information without navigating complex official sources.

- Technology Stack:

Backend AI Model: IBM Granite (granite-3.2-2b-instruct) for natural language processing and generation.

Framework: Gradio Blocks for building an interactive web-based interface.

Programming Language: Python (Torch + Transformers).

Security: User authentication (Sign Up & Login system).

UI Design: Custom styling with background colors, white card layouts, and embedded images for a professional look.

- Impact:

CitizenAI empowers people to stay informed, engage with civic data, and access government-related information effortlessly. It reduces barriers between public institutions and citizens by offering an AI-driven interface that is intuitive, accessible, and informative. This project can be scaled further to integrate real-time government databases, sentiment analysis, and multilingual support to serve a diverse population.

3. Architecture:

Citizen AI Architecture

1. **User Interface Layer (Frontend)**
    - Built using **Gradio Blocks**.
    - Provides pages for **Signup**, **Login**, **Home**, **City Analysis**, and **Citizen Services**.
    - Displays input fields (city name, queries) and output results (analysis, government responses).

- Styled with custom CSS (background color, cards, image).

2. **Application Layer (Backend Logic)**
   - Handles **authentication** (signup, login, session management with a fake user database).
   - Contains **business logic functions**:
     - city_analysis(city_name) → generates city safety insights.
     - citizen_interaction(query) → answers citizen queries.
   - Routes user actions (button clicks) to the correct functions.
3. **AI Model Layer (Granite Model)**
   - Uses **Hugging Face Transformers** with **IBM Granite 3.2-2B Instruct model**.
   - Functions like generate_response() call the model for text generation.
   - Runs on **GPU** if available (CUDA), otherwise on CPU.
   - Provides context-aware and fluent natural language responses.
4. **Data Layer (User Data + Inputs/Outputs)**

- Stores **temporary user accounts** (username/password).
- Accepts **user input** (city names, queries) and returns **generated outputs**.
- Currently no persistent database (in-memory storage only).

🔗Flow of Execution

- ❖ **User → Gradio UI**: User signs up, logs in, and enters queries/city names.
- ❖ **Gradio → Backend**: Inputs are passed to Python functions (city_analysis, citizen_interaction).
- ❖ **Backend → Model**: Functions format a prompt and send it to the Granite model via generate_response().
- ❖ **Model → Backend → UI**: Model output is decoded and shown back to the user in the Gradio interface.

4.Setup Instructions:

Citizen AI – Setup Instructions

1. Prerequisites

- **Python 3.9+** installed → check with:
- python --version
- **pip** (Python package manager) installed → check with:
- pip --version
- **VS Code** (or any IDE) for development.

- **GPU (optional)** → if available, the Granite model will run faster using CUDA.

2. Clone or Create Project Folder

mkdir CitizenAI

cd CitizenAI

Place these files inside:

- app.py (your main Python code)
- citizenai.jpg (home page image)

3. Create a Virtual Environment (Recommended)

python -m venv venv

Activate it:

- Windows:
- venv\Scripts\activate
- Linux/Mac:
- source venv/bin/activate

4. Install Dependencies

pip install torch transformers gradio

5. Run the Application

python app.py

You’ll see output like:

Running on local URL: http://127.0.0.1:7860

Running on public URL: https://xxxx.gradio.live

- Open the **local URL** in your browser to use CitizenAI.
- If you want to share, use the **public Gradio link**.

6. Usage Flow

1. **Sign Up** → Create a new account.
2. **Login** → Enter credentials to access the app.
3. **Home Page** → Overview with text + image.
4. **City Analysis Tab** → Enter a city name to get crime/safety/traffic insights.
5. **Citizen Services Tab** → Ask questions about government policies/services.

5.Folder Structure:

CitizenAI Project Structure

CitizenAI/

 | —— app.py # Main application (Gradio + Granite + Auth)

 | —— requirements.txt # Python dependencies

 | —— README.md # Setup instructions & project overview

 | —— citizenai.jpg # Home page image (or replace with your own)

 ├—— templates/ # (Optional, if you later use Flask or HTML templates)

 | └—— base.html

```
├── static/                 # Static assets (if needed)
│   ├── css/
│   │   └── style.css       # Custom CSS (if you expand styling)
│   ├── js/
│   │   └── script.js       # JS scripts (if needed later)
│   └── images/
│       └── logo.png        # Additional images
│
├── data/                   # (Optional) For saving data
│   └── users.db            # Replace fake DB with real one later
│
└── docs/                   # Documentation files
    └── architecture.png    # Architecture diagram (for reports/presentations)
```

📌What Each Folder/File Does

- app.py → Your full Gradio + IBM Granite app with signup/login/home/city/citizen services.

- requirements.txt → Lists all dependencies (torch, transformers, gradio).
- README.md → Setup instructions, project explanation.
- citizenai.jpg → Image displayed on Home tab.
- static/ → For extra CSS/JS/images if you customize the frontend more.
- data/ → Placeholder for database integration (if you add persistent user accounts later).
- docs/ → Project reports, diagrams, documentation.

6.Running the Application:

- ► Open terminal and go to your project folder: cd CitizenAI.
- ► (Optional) Activate your virtual environment (venv\Scripts\activate on Windows or source venv/bin/activate on Linux/Mac).
- ► Install dependencies with: pip install -r requirements.txt (or manually install torch transformers gradio).
- ► Run the app: python app.py.
- ► Open the given local URL (http://127.0.0.1:7860) in your browser.
- ► Sign up → Login → Use Home, City Analysis, and Citizen Services tabs.

7.API Documentation:

CitizenAI provides two main API-like functions through its Gradio interface.

- city_analysis(city_name) → Takes a city name as input and returns an AI-generated report covering crime index, accident rates, and overall safety.
- citizen_interaction(query) → Takes a user query about government services, policies, or civic issues and returns a relevant AI-powered response.
  Both functions internally call generate_response(prompt), which formats the input, sends it to the IBM Granite model, and returns a natural language answer.
  The API is accessible via the Gradio UI or can be integrated programmatically by importing the functions in Python.

8. Authentication:

CitizenAI uses a basic authentication system with Signup and Login features.
Users first sign up by creating a username and password, which are stored in a temporary in-memory dictionary.
On the login page, the system checks the entered credentials against stored records.
If valid, access is granted to the Home, City Analysis, and Citizen Services tabs.
If invalid, an error message is shown and access is denied.
Currently, authentication is session-based only (no external database).

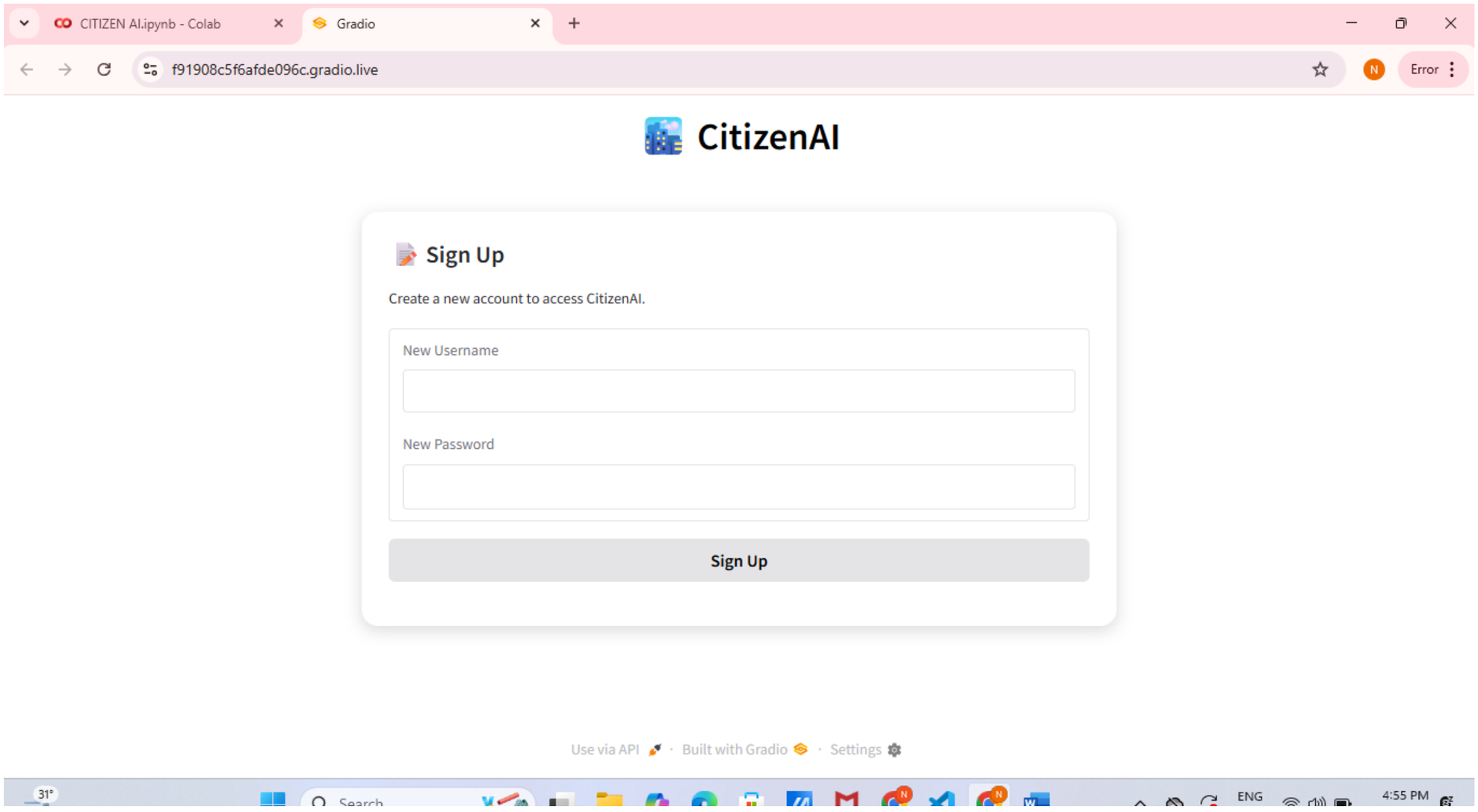
9.User Interface:

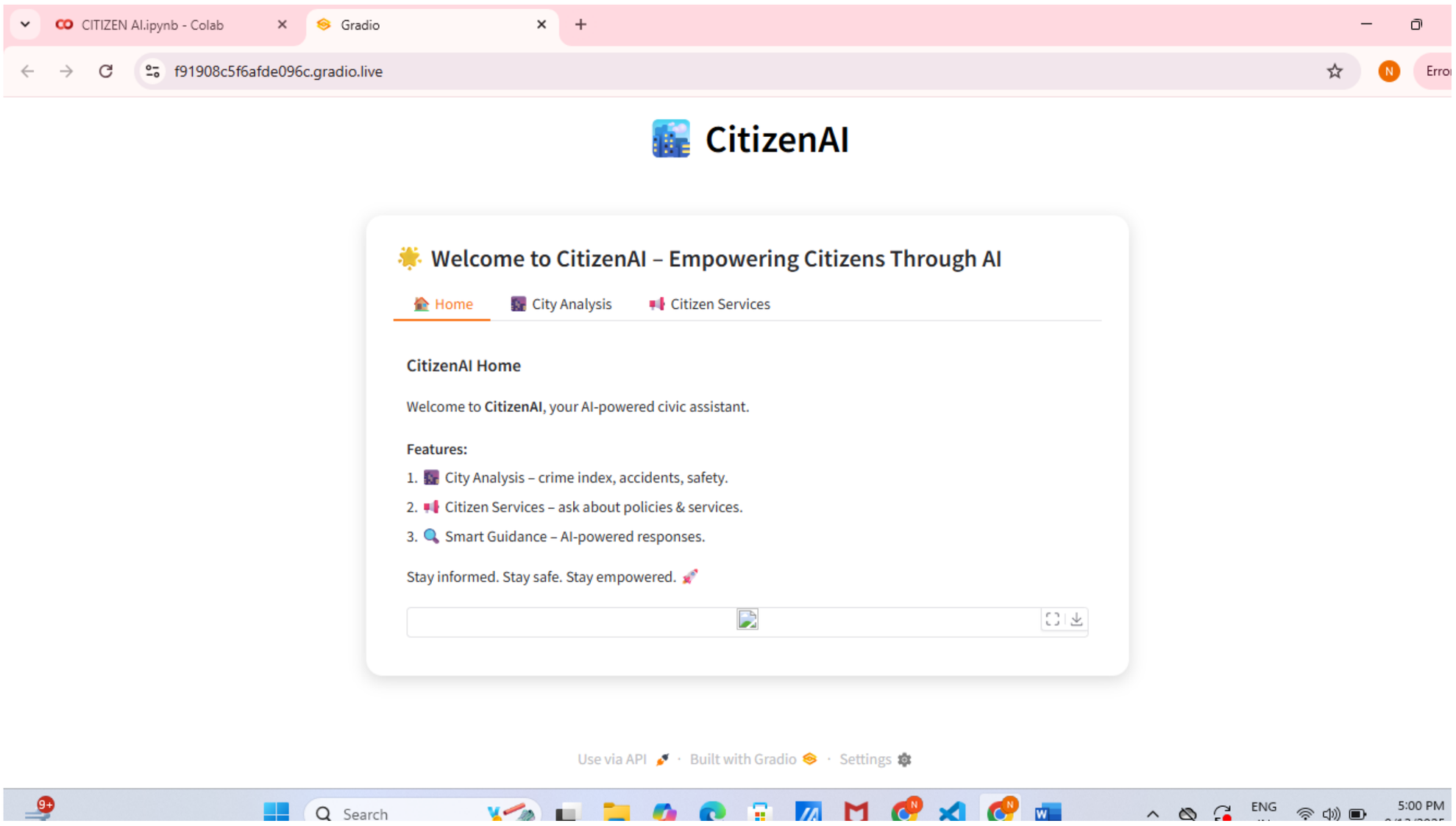
CitizenAI’s user interface is built with Gradio Blocks and styled using custom CSS.
It has a Signup page (for new users) and a Login page (for returning users), both displayed as white cards on a light blue background.
After login, users access the Home page, which shows project details and an image with a clean left – right layout.
Navigation is provided through tabs: 🏠Home, 🌆City Analysis, and 📢Citizen Services.
Inputs are handled via textboxes and actions triggered by buttons, with results shown in expandable text areas.
The design is modern, responsive, and user-friendly, making it easy for citizens to interact.

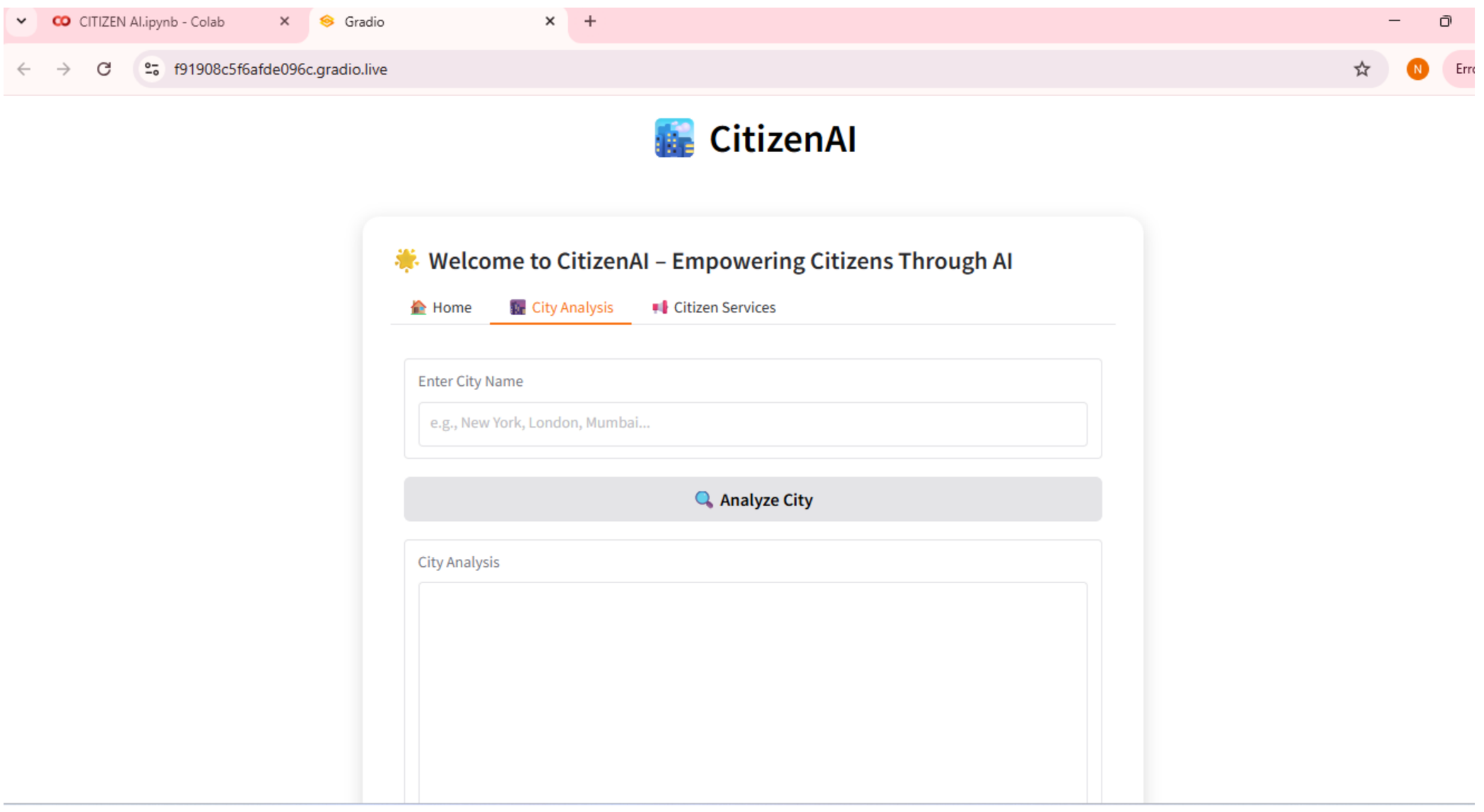
10.Testing:

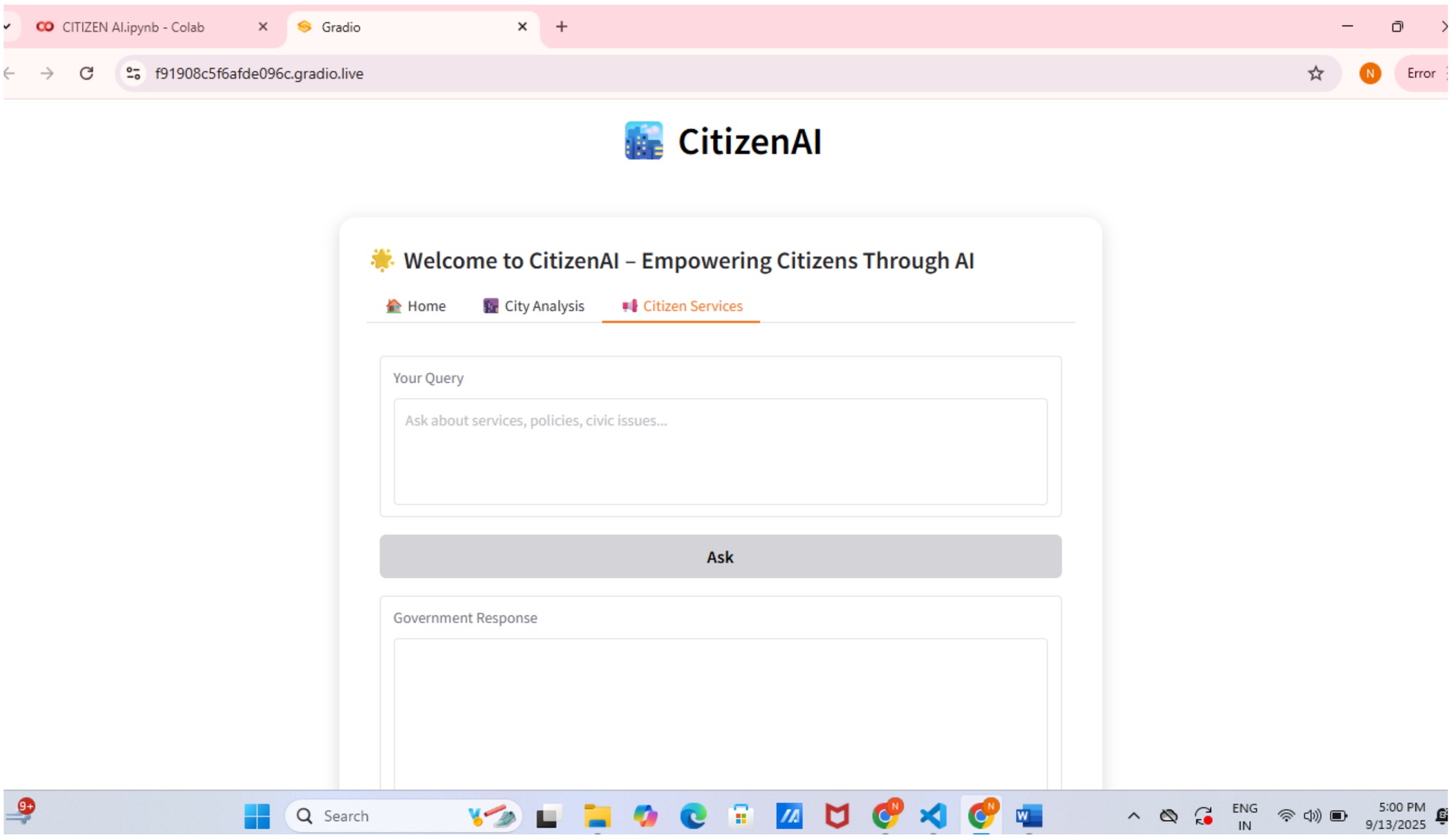
CitizenAI was tested using manual functional testing through the Gradio web interface.The Signup and Login modules were verified with valid and invalid credentials.The Home page was checked for proper layout, image loading, and feature descriptions.In the City Analysis tab, different city names were tested to ensure the model generates safety insights.In the Citizen Services tab, various queries about government policies and services were used to check AI responses.Overall, the app passed basic usability and functionality tests, confirming smooth user interaction.

11.Screen Shots:




CITIZEN AI.ipynb - Colab
Gradio
f91908c5f6afde096c.gradio.live
CitizenAI
Welcome to CitizenAI – Empowering Citizens Through AI
Home
City Analysis
Citizen Services
CitizenAI Home
Welcome to CitizenAI, your AI-powered civic assistant.
Features:
1. City Analysis – crime index, accidents, safety.
2. Citizen Services – ask about policies & services.
3. Smart Guidance – AI-powered responses.
Stay informed. Stay safe. Stay empowered.
Use via API · Built with Gradio · Settings
Search
ENG
5:00 PM


CITIZEN AI.ipynb - Colab
Gradio
f91908c5f6afde096c.gradio.live
CitizenAI
Welcome to CitizenAI – Empowering Citizens Through AI
Home
City Analysis
Citizen Services
Enter City Name
e.g., New York, London, Mumbai...
Analyze City
City Analysis



12.Known issues:

The app currently uses an in-memory user database, so accounts are lost when the server restarts.Authentication is basic (no encryption or session tokens), making it unsuitable for production.The IBM Granite model may generate long or slightly off-topic responses due to its generative nature.
Performance may be slow on CPU-only systems since the model is large and optimized for GPU.The UI does not yet include a Logout option to return to the login screen.No

persistent logging or error handling is implemented for failed model calls or invalid inputs.

13.Future enhancement:

CitizenAI can be enhanced by integrating a real database (SQLite/MySQL) for persistent user accounts.Adding secure authentication (password hashing, JWT tokens, logout option) will improve security.The UI can be extended with role-based access (citizen, admin, government officer).Integration with real-time APIs (crime statistics, government portals) can provide factual data alongside AI responses.Performance can be optimized by deploying on cloud with GPU (AWS, GCP, or IBM Cloud).Mobile-friendly progressive web app (PWA) support could make CitizenAI accessible on all devices.