Project Report: Sustainable Smart City Assistant

1. INTRODUCTION

1.1 Project Overview

The Sustainable Smart City Assistant is an AI-powered chatbot that answers questions about sustainability in smart cities. It uses NLP models from Hugging Face, integrated with Streamlit and FastAPI. The assistant supports voice/text input, document uploads, and provides insights based on Wikipedia and PDFs.

1.2 Purpose

The purpose is to support citizens, researchers, and planners by providing accurate and instant responses to sustainability-related queries using LLMs and data visualization.

2. IDEATION PHASE

2.1 Problem Statement

Lack of accessible systems that can guide people on sustainability practices and smart city planning using AI.

2.2 Empathy Map Canvas

Think & Feel: Needs quick answers

See: Scattered data

Say & Do: Searches online

Hear: Sustainability trends

Pain: Info overload

Gain: Instant insights

2.3 Brainstorming

Ideas included AI Q&A, PDF search, voice input, Wikipedia + LLM, and data charts.

3. REQUIREMENT ANALYSIS

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3.1 Customer Journey map

User -> Enters query -> NLP analysis -> Processing -> Response

3.2 Solution Requirement

Hugging Face LLMs, FAISS, Streamlit, FastAPI, voice/text modules

3.3 Data Flow Diagram

Input -> Streamlit UI -> FastAPI -> NLP Engine -> Response

3.4 Technology Stack

Frontend: Streamlit, Backend: FastAPI, NLP: Hugging Face, Voice: pyttsx3, speech_recognition

4. PROJECT DESIGN

4.1 Problem Solution Fit

Bridges the gap between knowledge and accessibility.

4.2 Proposed Solution

Assistant features: natural language Q&A, PDF input, voice support, visualizations.

4.3 Solution Architecture

User -> Streamlit UI -> FastAPI -> NLP + Wikipedia + FAISS -> Response

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Week 1: Ideation

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Week 2-3: Development

Week 4: Integration

Week 5: Testing

Week 6: Final report & demo

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

API tested using Swagger UI. LLM response: <2s, PDF: <5s, Concurrent users supported.

7. RESULTS

7.1 Output Screenshots

[Insert screenshots of UI, charts, and voice input]

8. ADVANTAGES & DISADVANTAGES

Advantages

Voice support, Fast responses, Visual insights, User-friendly.

Disadvantages

Needs internet, Limited file support, Voice accuracy varies.

9. CONCLUSION

The assistant is a valuable tool for promoting smart city sustainability using modern AI tools in an accessible format.

10. FUTURE SCOPE

Add multilingual support, mobile app, real-time APIs, map visualization, and fine-tuning.

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11. APPENDIX

Source Code

Included in GitHub repo

Dataset Link

[Provide link]

GitHub & Project Demo Link

[Insert GitHub and demo links]