**Project Design Phase-II**

**Technology Stack (Architecture & Stack)**

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| Date | 20 jun 2025 |
| Team ID | LTVIP2025TMID32673 |
| Project Name | Sustainable Smart City Assistant AI by using IBM granite LLM |
| Maximum Marks | 4 Marks |

**Table-1: Components & Technologies**

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| --- | --- | --- | --- |
| S.No | Component | Description | Technology |
| 1 | User Interface | Citizen interface for web, mobile, chatbot, and voice UIs | HTML, CSS, Streamlit |
| 2 | Application Logic-1 | Logic to process user requests and route queries | Python (FastAPI), Flask |
| 3 | Application Logic-2 | Natural language speech-to-text for voice interface | Google colab ,weather API |
| 4 | Application Logic-3 | AI-based assistant interface for contextual interaction | IBM granite LLM, Dialogflow |
| 5 | Database | Stores user profiles, queries, feedback, and usage logs | PostgreSQL |
| 6 | Cloud Database | Cloud-hosted backup and analytics-ready DB | Straemlit |
| 7 | File Storage | Storage for documents, feedback screenshots, reports | IBM Cloud Storage |
| 8 | External API-1 | Pollution and weather data retrieval | OpenWeatherMap API, AQICN API |
| 9 | External API-2 | Address validation and Aadhar verification | UIDAI Aadhar API, Google Maps API |
| 10 | Machine Learning Model | Predictive analytics for usage trends and sustainability | Scikit-learn, TensorFlow, XGBoost |
| 11 | Infrastructure | Hybrid deployment (local testing and cloud deployment) | Local: Ubuntu VM; Cloud: AWS EC2, GCP VM |

**Table-2: Application Characteristics**

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| --- | --- | --- | --- |
| S.No | Characteristics | Description | Technology |
| 1 | Open-Source Frameworks | Use of community-supported ML/NLP and web frameworks | Flask, FastAPI, Streamlit |
| 2 | Security Implementations | Authentication, encryption, API key protection, access control | , HTTPS, OAuth2, IAM, SHA-256, OWASP-10 |
| 3 | Scalable Architecture | Microservices with containerization for flexible scaling across services | REST APIs |
| 4 | Availability | Multi-zone cloud with load balancer, auto-healing groups | github |