**Project Design Phase-II**

**Technology Stack (Architecture & Stack)**

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| Date | 31 January 2026 |
| Team ID | LTVIP2026TMIDS88360 |
| Project Name | Civil engineering insight studio |
| Maximum Marks | 4 Marks |

**Technical Architecture:**

**Table-1 : Components & Technologies:**

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| --- | --- | --- | --- |
| **S.No** | **Component** | **Description** | **Technology** |
| 1. | **User Interface** | Web-based interactive dashboard for text input and real-time translation display. | Streamlit, HTML5, CSS3 |
| 2. | **Application Logic-1** | Core backend processing, API orchestration, and text pre-processing. | Python |
| 3. | **Application Logic-2** | Logic for audio-to-text conversion for the travel scenario. | Image-to-Text (STT) Library |
| 4. | **Application Logic-3** | Specialized logic for preserving academic citations and professional tone. | Python (Regex/Formatting scripts) |
| 5. | **Database** | Storage for user session history and frequent translation pairs. | SQLite / PostgreSQL |
| 6. | **Cloud Database** | Persistent storage for user profiles and saved translations on the cloud. | Google Cloud SQL / AWS RDS |
| 7. | **File Storage** | Temporary storage for uploaded research papers and business documents. | Local Filesystem / Google Cloud Storage |
| 8. | **External API-1** | Primary Large Language Model for multi-language translation. | Google Generative AI (Gemini) API |
| 9. | **External API-2** | Logic for document structure analysis and OCR for signs/menus. | Google Cloud Vision (OCR) API |
| 10. | **Machine Learning Model** | Fine-tuned instructions for context-aware translation logic. | Google Gemini 2.5 flash |

**Table-2: Application Characteristics:**

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| --- | --- | --- | --- |
| **S.No** | **Characteristics** | **Description** | **Technology** |
| **S.No** | **Characteristics** | **Description** | **Technology** |
| 1. | **Open-Source Frameworks** | Utilizes open-source libraries for rapid deployment and UI rendering. | Streamlit, Pandas, NumPy |
| 2. | **Security Implementations** | Implemented API key rotation and secure document handling protocols. | SHA-256 Encryption, IAM Controls |
| 3. | **Scalable Architecture** | 3-Tier architecture separating UI, Logic, and AI Services. | Micro-services via API calls |
| 4. | **Availability** | Distributed cloud hosting to ensure the tool is available for global users. | Load Balancers (GCP/AWS) |
| 5. | **Performance** | Asynchronous API calls to ensure translation returns within 2-5 seconds. | Cache mechanisms / Asyncio |