**Software Design Specification**

**Bilingual AI Virtual News Anchor**

Project Code:

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**Definition of Terms, Acronyms, and Abbreviations**

| Term | Description |
| --- | --- |
| TTS | Text-to-Speech |
| API | Application Program Interface |
| Avatar | A virtual character used for video-based news presentation |

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**1. Introduction**

**1.1 Purpose of Document**

This document outlines the design specifications for the "Bilingual AI Virtual News Anchor." It is intended for developers, stakeholders, and the project team. The document uses an object-oriented design methodology to ensure a scalable, maintainable, and efficient system.

**1.2 Project Overview**

The system is an AI-powered virtual news anchor delivering news in English and Urdu, with:

* Real-time news fetching using APIs or web scraping.
* Bilingual audio conversion using Text-to-Speech (TTS) systems.
* Presentation via a customizable 3D avatar with accurate lip-syncing.

**1.3 Scope**

The system will:

* Fetch and categorize real-time news.
* Convert text to natural audio in English and Urdu.
* Present news via a 3D avatar.
* Be desktop-compatible with future plans for cloud scalability.

**2. Design Considerations**

**2.1 Assumptions and Dependencies**

* Dependence on APIs for news retrieval and TTS conversion.
* Use of open-source tools (e.g., Coqui TTS, Three.js).
* Stable internet connection for real-time functionality.

**2.2 Risks and Volatile Areas**

* API changes could disrupt real-time news retrieval.
* Scalability challenges with increased user demand.
* Cultural and linguistic accuracy risks in bilingual news delivery.

**3. System Architecture**

**3.1 System Level Architecture**

The system comprises three primary components:

1. **News Fetching Module**: Retrieves real-time news using APIs and web scraping.
2. **TTS Module**: Converts news text into audio in English and Urdu.
3. **Avatar Presentation Module**: Animates a 3D avatar for news delivery.

**3.2 Sub-System / Component / Module Level Architecture**

* **News Fetching**:
  + APIs: NewsAPI, BeautifulSoup.
* **TTS**:
  + Tools: Coqui TTS, Google TTS.
* **Avatar Presentation**:
  + Tools: Blender, Three.js.

**3.3 Sub-Component / Sub-Module Level Architecture**

* Sub-modules for news categorization, lip-sync synchronization, and UI/UX design.

**4. Design Strategies**

**4.1 Strategy Details**

* Use modular architecture for scalability.
* Leverage open-source tools to minimize costs.
* Ensure a user-friendly interface with accessibility features.

**5. Detailed System Design**

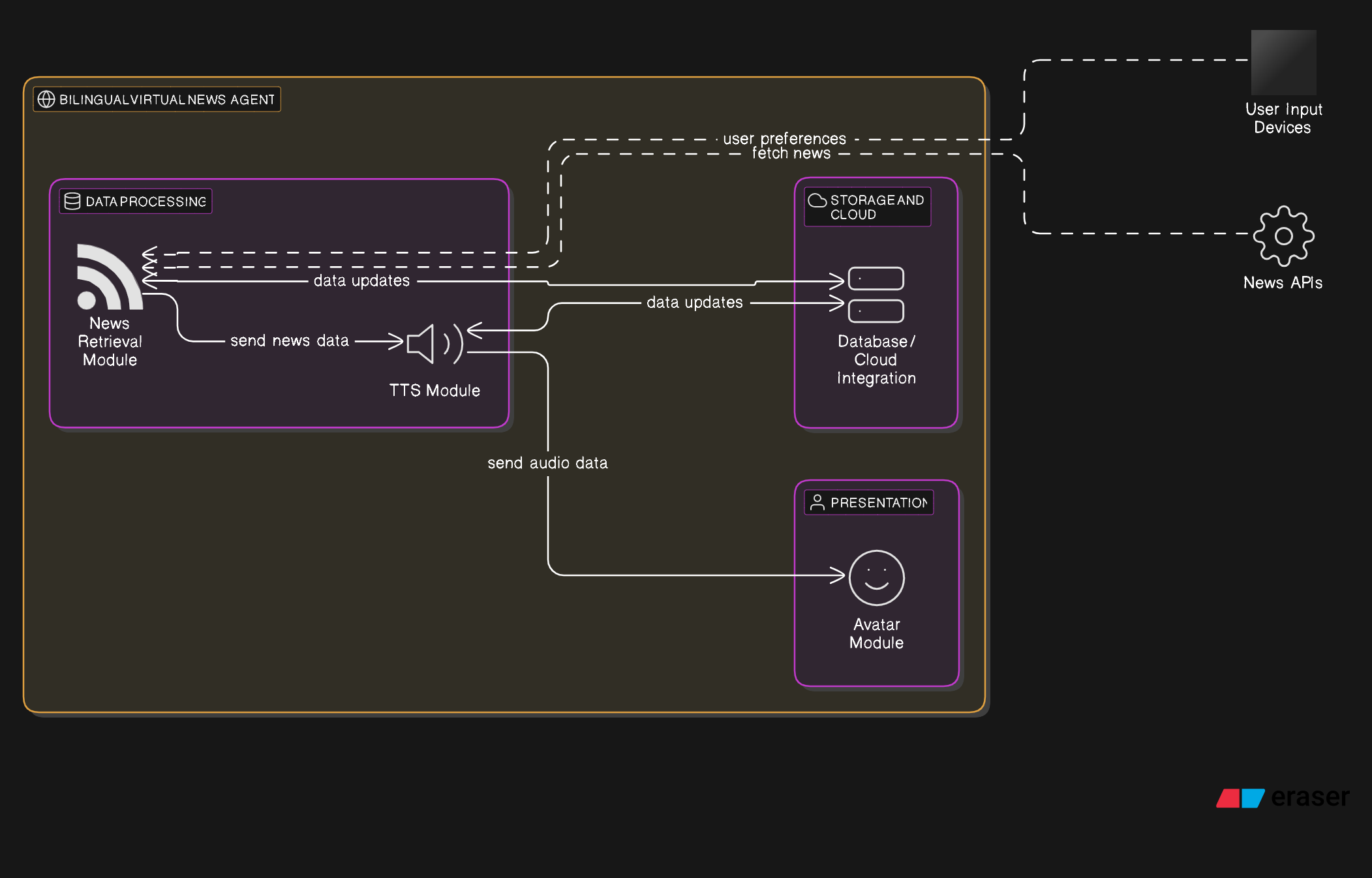
* **Class Diagrams**: Detailed classes for modules and their interactions.
* **Sequence Diagrams**: Depict workflows for news fetching, TTS conversion, and avatar animation.
* **State Transition Diagrams**: Outline system states during news delivery.
* **Logical Data Models**: Entity-Relationship diagrams for data management.
* **GUIs**: Mockups of user interfaces for desktop platforms.

**7. References**

| Ref. No. | Document Title | Date of Release/ Publication | Document Source |
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**8. Appendices**

**Appendix A: Architecture Diagram**



**Appendix B: Data Flow Diagram**

