Technical Documentation: AI-Gurukul

---

1. Introduction

This document details the technologies used, deployment strategy, and scalability considerations for the AI, AR, and VR-powered educational platform designed to create immersive, personalized, and accessible learning experiences. The platform integrates modern technologies to address the challenges of traditional educational systems by fostering engagement, customization, and effective skill-building.

2. Technologies Used

Frontend Technologies:

- **React.js and Next.js:** To build a responsive and interactive user interface for the platform, including the landing page, dashboard, and chatbot.
- **Three.js:** To render and display 3D models in the Interactive Biology Lab, utilizing. gltf model formats.
- **Tailwind CSS:** For rapid UI development with consistent and customizable designs.
- **Framer Motion:** For adding smooth animations and transitions, enhancing user experience and interactivity.

Backend Technologies:

- **Node.js:** Backend server to manage API requests and process user data.
- **MongoDB:** To store user profiles, quiz results, and content recommendations, ensuring scalability and flexibility.
- **AgroJDK Service:** For seamless video conferencing functionality.

AI Integration:

- **Chatbot:** AI-powered conversational agent for interaction, built using advanced NLP models.
- **Notes Generation:** AI-driven feature for creating personalized and relevant study notes for users.
- **Gemini Key:** For enhanced AI functionality and integration, enabling secure and efficient processing.

AR/VR Technologies:

- **Three.js:** For rendering and interactive 3D experiences in AR/VR environments.
- **WebXR:** To deliver lightweight virtual reality content for an immersive virtual classroom experience.

3. Deployment Strategy

Development and Testing:

- **Version Control:** Git and GitHub for collaborative development and source code management.
- **CI/CD Pipeline:** GitHub Actions to automate build, testing, and deployment.

Hosting and Deployment:

- Deployed on Vercel for fast global delivery and seamless integration with the development workflow.

Security:

- **JWT (JSON Web Tokens):** For user authentication and session management.

4. Scalability Considerations

- **Advanced AI Models:** Implementation of more advanced NLP and ML models to enhance chatbot intelligence and improve learning recommendations.
- **Expanding Content Library:** Addition of more subjects, topics, and 3D interactive models for broader coverage.
- **Global Reach:** Localization of content in multiple languages to cater to a global audience.
- **Collaborative Learning:** Integration of collaborative tools such as group discussions and shared virtual labs.
- **Gamification:** Adding gamified elements like badges, leaderboards, and rewards to increase engagement.

5. Key Features

1. **Landing Page:** Engaging UI introducing the platform's features and benefits.
2. **Chatbot:** AI-driven conversational agent for onboarding and assistance.
3. **Prequiz:** Adaptive screening to assess user's strengths, weaknesses, and learning goals.
4. **Dashboard:** Personalized roadmap with curated articles, videos, and virtual classroom experiences.
5. **Final Quiz:** Evaluation to measure learning outcomes and progression.
6. **Interactive Biology Lab:** 3D models for hands-on exploration of biological concepts.
7. **AlgoLab:** Algorithm visualizer to aid in understanding data structures and algorithms.