

Sri Eshwar College of Engineering (Autonomous)

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Department of Information Technology

Final Review

Lab name: project using design thinking Course
code: U23IT651

EduViz:An Interactive 3D Learning Platform

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Abstract

- EduViz is an interactive 3D learning platform that transforms traditional education through immersive visualizations.
- Enables students to explore complex concepts in engineering, medicine, physics, and architecture using interactive 3D models.
- Improves understanding and retention with zoom, rotate, and dissect features powered by real-time rendering.
- Eliminates learning barriers found in static textbooks and videos through hands-on digital exploration.
- Fully responsive and accessible on the web with cloud-based model storage and seamless performance.
- Built using React.js, Three.js, Node.js, MongoDB (GridFS), and GSAP for smooth animations.

Introduction

- 3D interactive models to visually represent subject content.
- Immersive animations to simplify complex topics in engineering, medicine, physics, and more.
- Real-time interactivity that lets students rotate, zoom, and dissect virtual objects.
- Cloud-based access for seamless learning from any device.
- Built with modern technologies like React.js, Three.js, Node.js, and MongoDB (GridFS).
- EduViz ensures clarity, engagement, and deeper understanding empowering the next generation of learners.

Literature Survey

Title of The paper	Description	Publication details
PAPER 1. "3D Learning Environments in Education"	<p>Discusses the impact of 3D visualization on Supports the need for interactive 3D models in student engagement and understanding.</p>	Publishers, Volume No., Issue No., Year of Publication
2. "Web-Based 3D Model Platforms for E-Learning"	<p>Evaluates existing platforms that allow students to interact with 3D content.</p>	Highlights the gap in current learning tools that lack an integrated marketplace.

Literature Survey

Title of The paper	Description	Publication details
3. "Monetization Strategies for Digital Content Creators"	Analyzes business models used in online educational platforms.	Helps in designing an effective revenue system for EduViz.
4. "The Role of AI in Personalized Learning"	Technical study on rendering 3D models in web browsers.	Helps in selecting the right technology stack for EduViz.

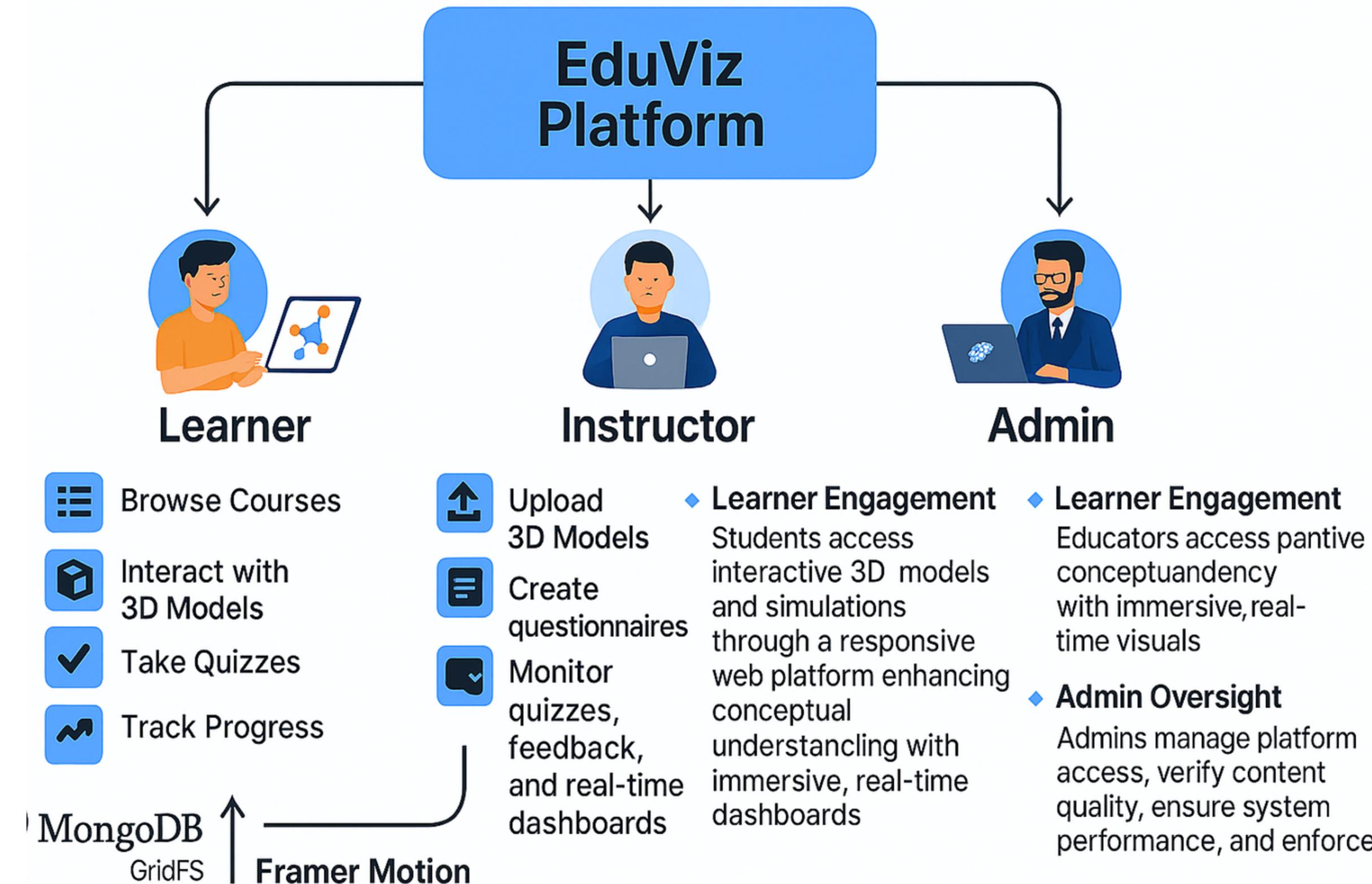
Existing System

- Traditional e-learning platforms (Udemy, Coursera, Khan Academy) rely on video-based learning, which lacks interactivity.
- Limited support for 3D interactive content, making learning less engaging.
- 3D content creators have no centralized platform to monetize their work efficiently.
- Current platforms do not offer real-time collaboration for learners and instructors.
- AR/VR headsets are expensive, so not everyone can use them for learning.

Proposed System

- Interactive 3D learning, beyond passive video.
- Enhanced engagement through hands-on 3D exploration, accessible via browser.
- Centralized platform for 3D creators to efficiently monetize their work.
- Real-time collaboration for dynamic learning.
- Affordable access through browser-based technology, eliminating expensive hardware costs.

Block Diagram



Algorithm/Techniques/Tools Used

React.js: Builds the user interface, making the platform interactive and responsive.

Model Viewer: Displays and allows interaction with 3D models directly in the browser.

Node.js: Powers the server, handling user data and application logic.

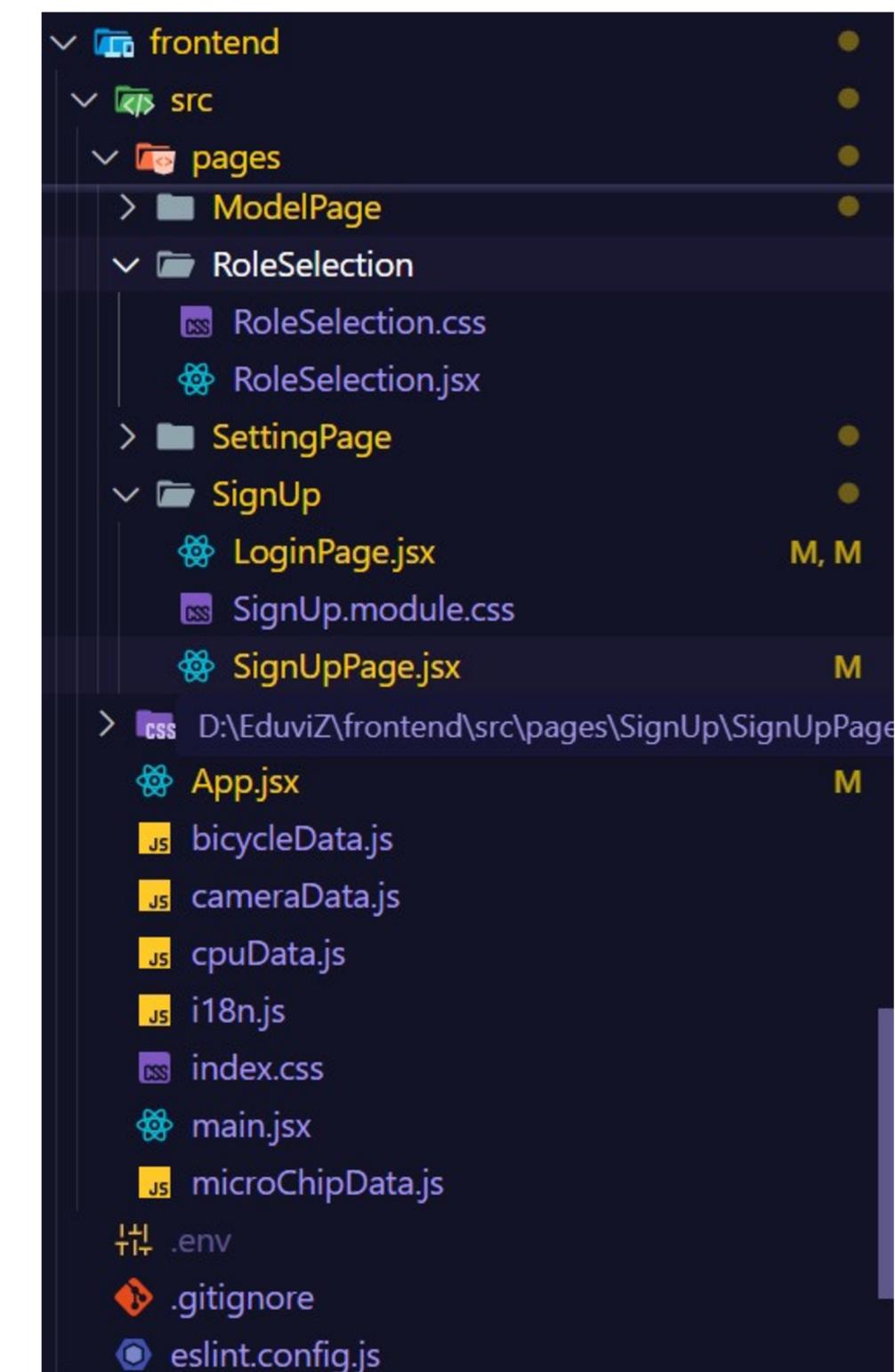
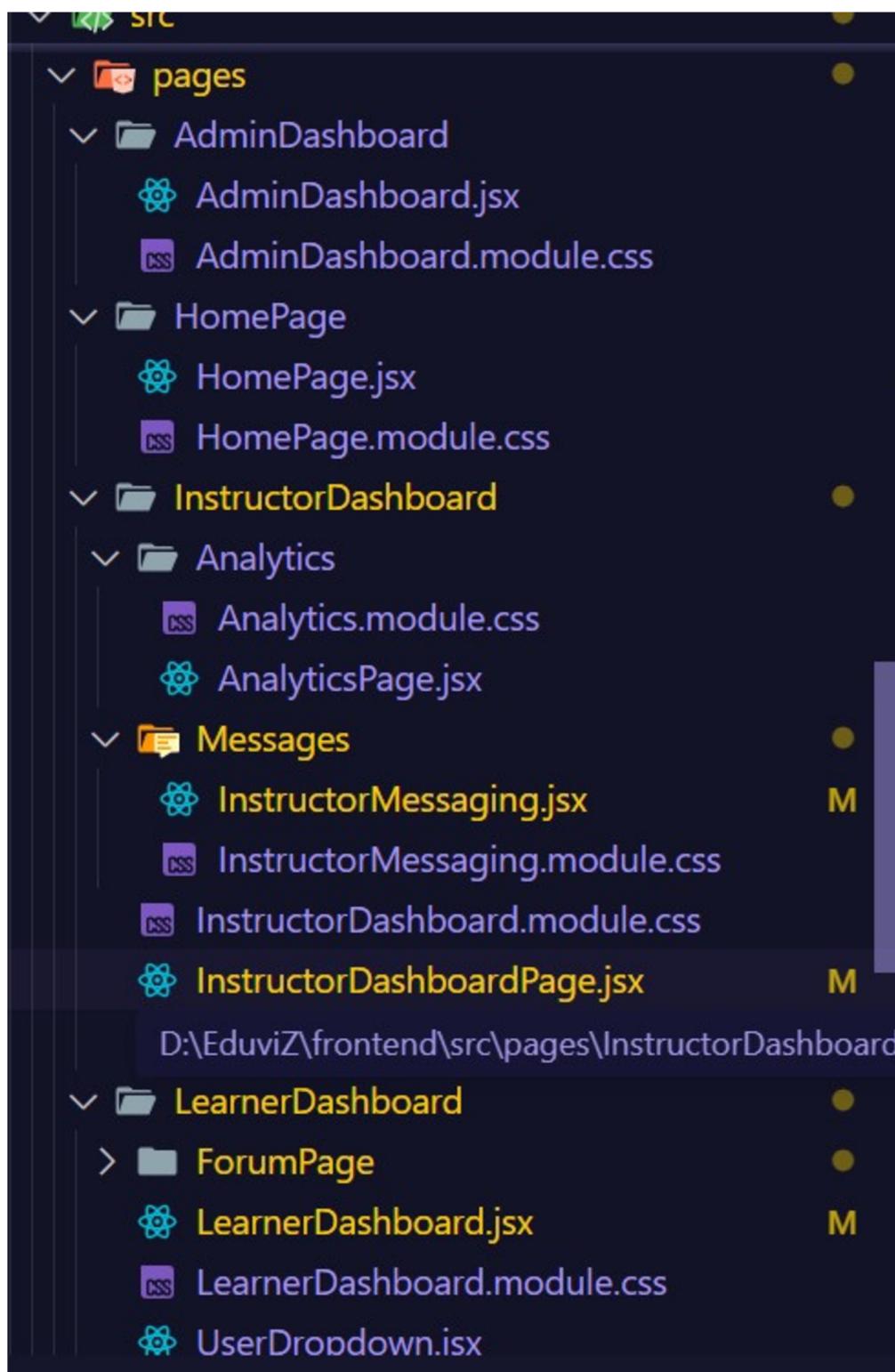
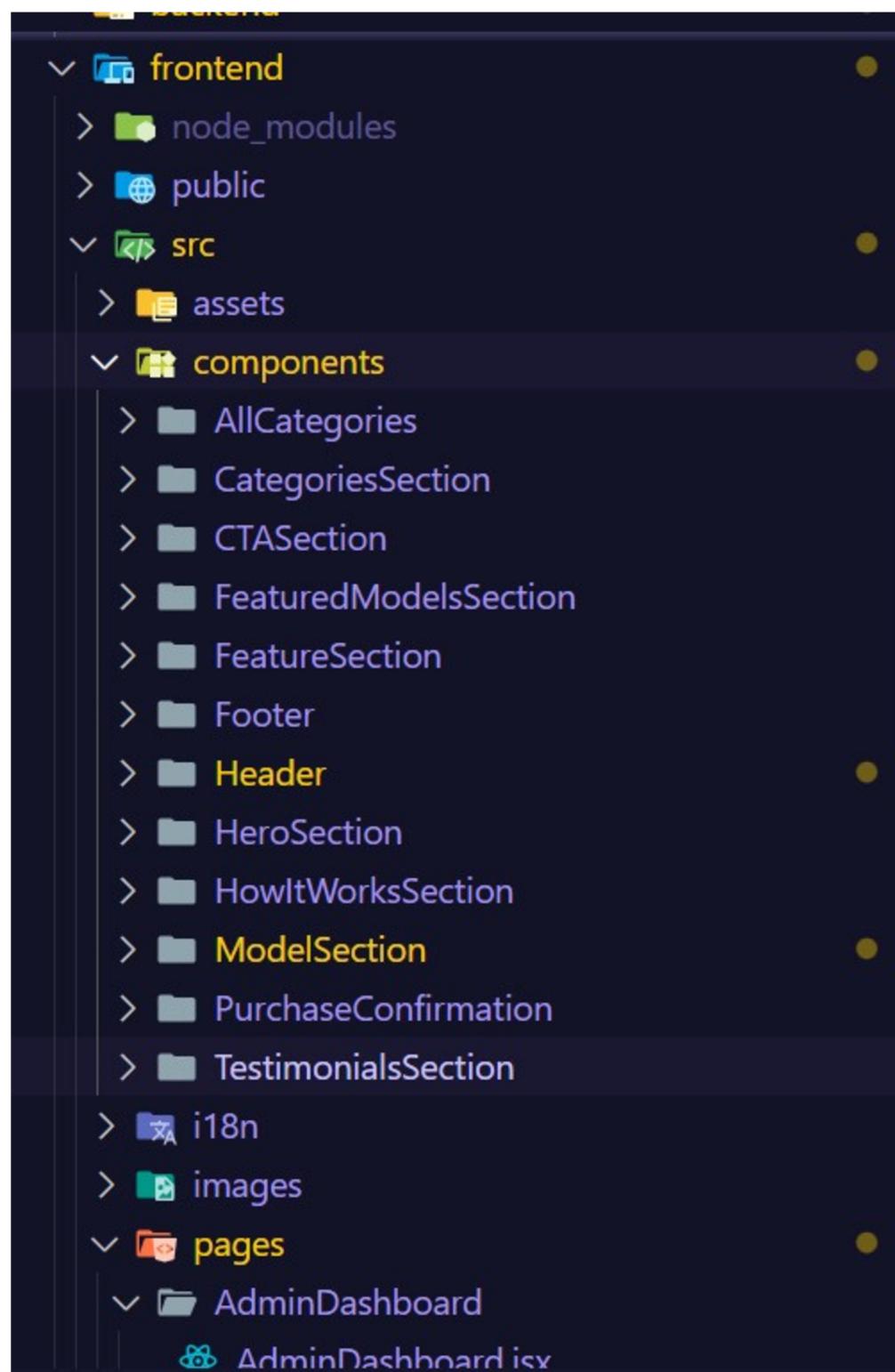
Express.js: Creates the web API, enabling communication between the frontend and backend.

MongoDB: Stores all application data, from user profiles to 3D model information.

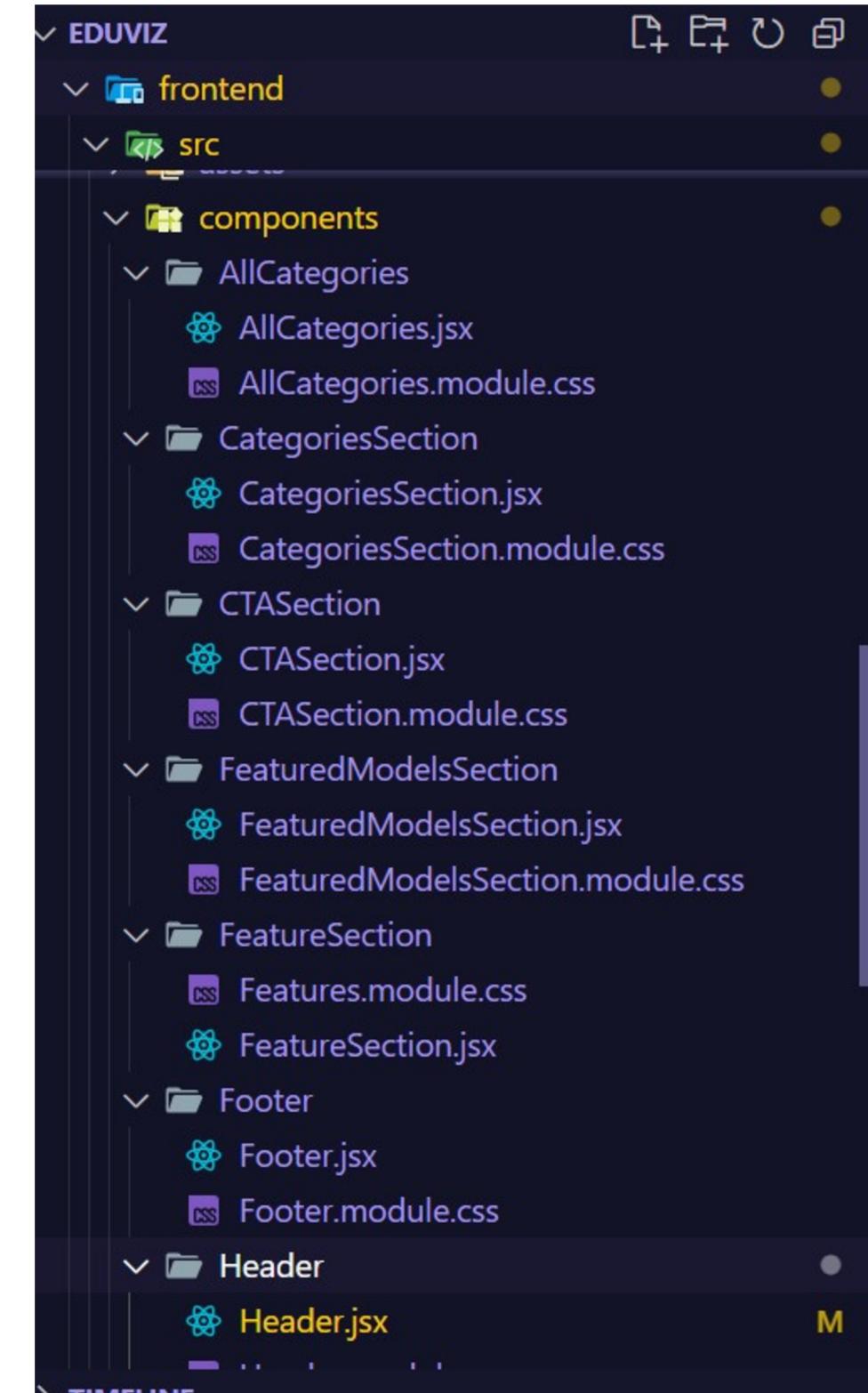
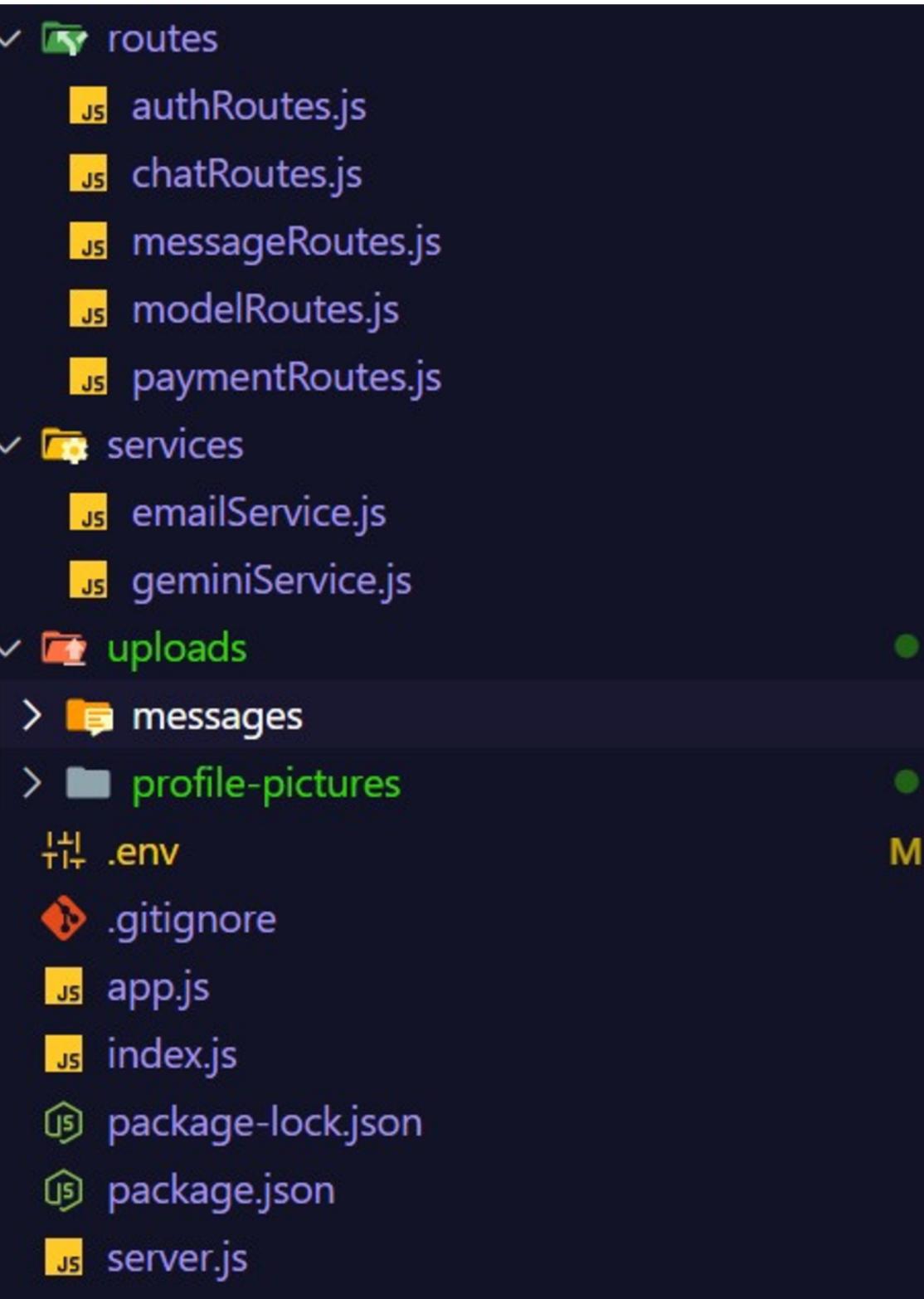
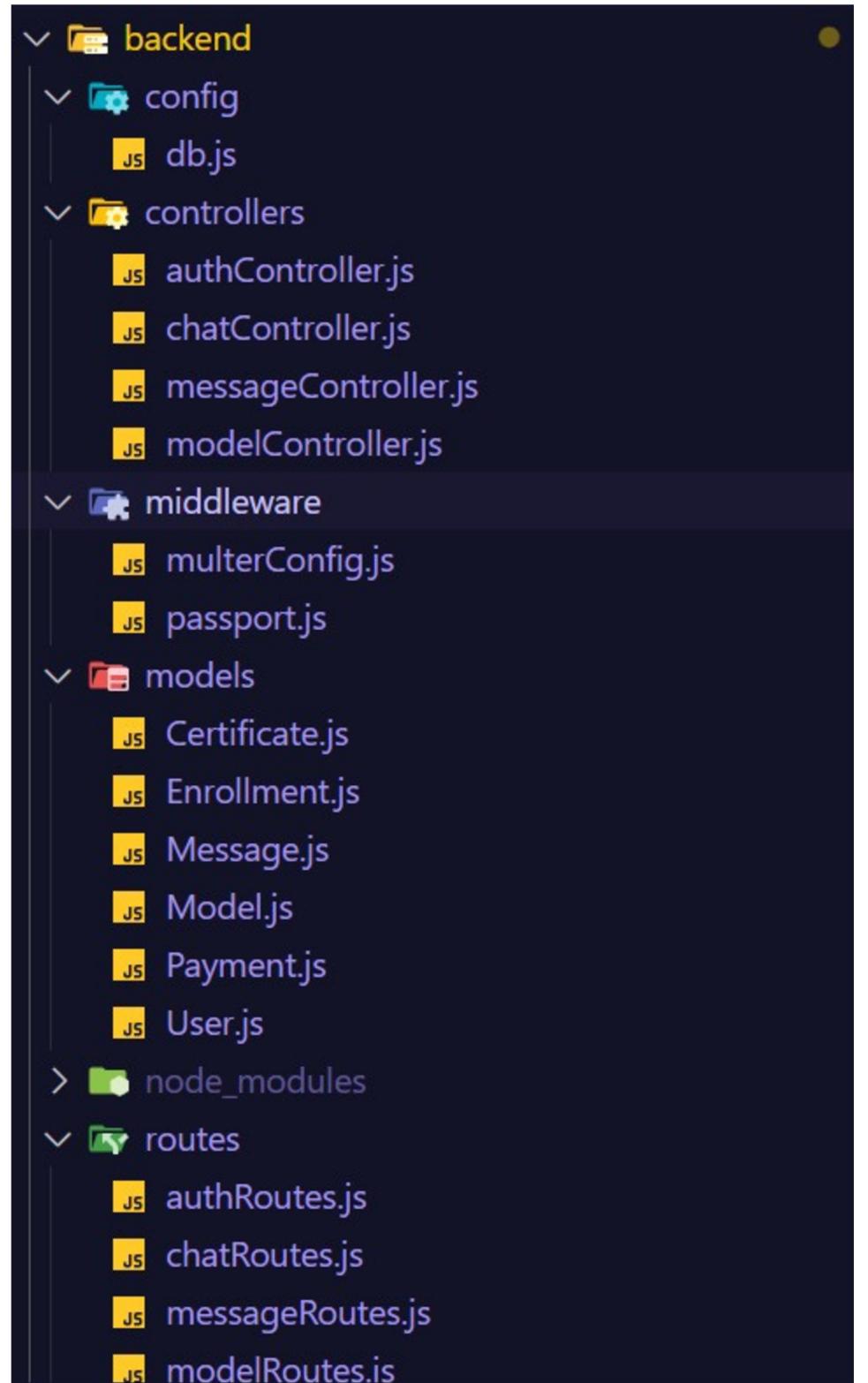
GLTF: Standard format for 3D models, ensuring efficient display in the browser.

WebGL: Renders 3D graphics in the browser, providing the interactive 3D experience.

Project Modules



Project Modules



System Requirements

- Client Devices: Modern browser with WebGL, 4GB RAM, dual-core processor, internet access.
- Instructor System: Desktop/Laptop with 8GB RAM, i5 processor (or equivalent), stable internet.
- Display: Minimum resolution 1280x720 for optimal 3D model interaction.
- Server Hosting: Cloud server (e.g., AWS, Vercel) with 4 vCPU, 8GB RAM, 100GB SSD.
- Database: MongoDB with GridFS for efficient 3D asset storage.
- Tech Stack: React.js, Three.js, Node.js, Express.js, MongoDB, GSAP.

Expected Outcomes

- Students will understand complex concepts more easily through 3D visualizations.
- Enhanced engagement and interactivity in digital learning environments.
- Real-time exploration of models with rotate, zoom, and dissect features.
- Platform accessible across devices with responsive UI.
- Seamless content management for instructors using a cloud-based system.

Specification & Budget

S.No	SOFTWARE SPECIFICATIONS
1.	Frontend: Developed using React.js and Three.js for interactive 3D rendering and smooth user experience.
2.	Backend: Powered by Node.js with MongoDB (GridFS) for storing and managing 3D assets and user data.

Conclusion

- EduViz enhances learning by offering an immersive and interactive 3D educational experience.
- It simplifies complex concepts through visual exploration, improving student understanding and retention.
- The platform demonstrates the power of modern web technologies in transforming traditional education.
- EduViz sets a foundation for future advancements like AR/VR integration in digital learning.

Conference/Journal Publication Status

1. Smart Attendance Management System Using Geo-Fencing and Face Recognition

International Journal of Creative Research Thoughts (IJCRT), 2023.

[Read Paper](#)

This study presents a geofencing-based student attendance management system integrating face recognition, Google Location Services, and Firebase for real-time tracking.

2. GPS-Based Attendance Management System with RFID Technology

International Journal of Engineering Research & Technology (IJERT), 2017.

[Read Paper](#)

This paper proposes an innovative geo-location-based real-time attendance management system implemented on an Android platform, integrating RFID and GPS for precise tracking.

3. Smart Shift Management: Embracing Biometric, Geofencing, and Cloud Innovations

EasyHR Blog.

[Read Article](#)

This article explores how biometric authentication, geofencing, and cloud-based solutions simplify shift scheduling and attendance tracking, enhancing workforce efficiency.

4. How Biometric and Geofencing Technology are Transforming Workforce Management

Employee Attendance Cloud (EAC), 2024.

[Read Article](#)

This piece explores the integration of biometric and geofencing technologies in modern clocking systems, addressing challenges such as buddy clocking and inaccurate clock-ins.

*Thank
You*