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Online Skill Assessment Using AI

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Abstract: ***The increasing demand for efficient and insightful skill evaluation in recruitment and education necessitates a move beyond traditional, manual assessment methods. This project details the design and development. A sophisticated AI-driven online skill assessment platform. Built with a modern, robust tech stack—Next.js for server-side rendering and API routes, TypeScript to ensure code reliability and maintainability, Tailwind CSS for a utility-first and responsive user interface, and MongoDB as the flexible NoSQL database—the platform intelligently automates the entire assessment lifecycle.***
The platform uses artificial intelligence to generate questions tailored to specific subjects and contexts, and to evaluate both descriptive and programming responses. Instead of relying on keyword matching, it examines logical flow, structural accuracy, and conceptual understanding, providing candidates with clear and actionable feedback.
The project was successfully deployed and tested, demonstrating its ability to reduce administrative overhead, eliminate grading bias, and deliver a highly detailed, personalized assessment experience. Skill AI serves as a proof of concept for integrating artificial intelligence into full-stack web applications, enabling more adaptive, fair, and intelligent educational technology solutions.

I. INTRODUCTION

The accelerating digital transformation has intensified the demand for proficient professionals across sectors. Traditional academic structures frequently lag behind, resulting in a mismatch between theoretical instruction and real-world skill expectations. The emergence of Educational Technology (EdTech) platforms has revolutionized how individuals acquire, assess, and validate their skills, yet many existing solutions lack comprehensive AI-powered assessment and personalized learning pathways. The global e-learning market is projected to reach $375 billion by 2026, indicating a massive shift towards digital education platforms. However, most current systems focus either on content delivery or assessment, rarely integrating both with intelligent analytics and personalized recommendations.

The gap highlights the need for an integrated system that blends AI assessments with customized learning. The integration of Artificial Intelligence in education has opened new possibilities for personalized learning and assessment. AI algorithms can analyze individual learning patterns, identify knowledge gaps, and adapt content delivery to optimize learning outcomes. Furthermore, natural language processing capabilities enable the generation of context-aware test questions and automated evaluation of complex responses.

Despite these technological advancements, most existing platforms utilize AI in limited capacities—either for content recommendation or automated grading—but rarely for comprehensive, end-to-end learning and assessment ecosystems. This opens a valuable avenue to harness cutting-edge AI systems, such as Google's Gemini, for building an educational platform that is smarter, more adaptive, and highly effective. Current market analysis reveals that while numerous online learning platforms exist, few offer integrated solutions that combine skill assessment, personalized learning paths, credential verification, and career advancement support. Platforms like Coursera and Udemy excel in content delivery but lack robust assessment mechanisms, while coding challenge sites like HackerRank focus primarily on evaluation without structured learning pathways.

II. LITERATURE REVIEW

Analyzed 50+ research papers on AI in education, adaptive learning systems, and skill assessment methodologies. Studied the implementation of NLP in automated evaluation systems from IEEE and ACM journals. Reviewed market analysis reports on EdTech growth trends and user behavior patterns. Examined case studies on successful online certification platforms and their impact on employment.

The research encompassed a review of more than fifteen platforms, including Coursera, Udemy, HackerRank, and LinkedIn Learning. It also analyzed technical whitepapers on AI and machine learning in educational technology, examined global certification standards and credential verification systems, and assessed market size and adoption trends of digital learning platforms across different regions.

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The study evaluated various AI and machine learning frameworks for educational applications. It examined database solutions designed to handle large-scale user data and support learning analytics. Research also focused on responsive design patterns to ensure compatibility across multiple devices. Security frameworks were reviewed to protect user data and preserve certificate integrity.

Collected data on preferred learning styles, assessment methods, and platform features. Gathered feedback on pain points with the existing learning and certification system. Assessed willingness to adopt AI-powered educational platforms. Performance testing under simulated high-load conditions.

III. PROPOSED SYSTEM

The proposed system integrates gesture recognition and voice assistance into a unified framework, ensuring consistency and alignment across the development team.

A. *Admin Module Features:*

1) Dashboard Analytics – Real-time overview of active students, pending approvals, and platform metrics.
2) Student Management – Add, view, update, or remove student profiles and track progress.
3) Certificate Approval Workflow – Review, verify, and issue digital certificates.
4) Resume Evaluation – AI-assisted review and feedback on student resumes.
5) Learning Content Management – Upload, organize, and update learning topics and resources.
6) Qualification & Ranking – Manually qualify students and manage leader board rankings.
7) Chat Interface – Direct and group messaging with students.

B. *Student Module Features:*

1) SkillAI Tests – AI-generated aptitude, technical, and HR tests with real-time results.
2) Personalized Learning Paths – Curated topics and resources based on test performance.
3) Achievement Tracking – Badges, scores, and progress indicators.
4) Leaderboard – Compete with peers based on scores and activity.
5) Certificate Requests – Apply and track certificate issuance.
6) Resume Builder – An AI-powered tool that helps users craft, refine, and submit resumes by providing personalized feedback and suggestions for improvement.
7) Chat with Admin – Request support and get responses in real time.

C. *Technologies Used*

1) Frontend:

Next.js 14 is a framework built on React that introduces the App Router to support efficient server-side rendering. TypeScript provides type safety for JavaScript, enabling scalable and maintainable application development.

Tailwind CSS is a utility-first framework that enables the creation of responsive user interfaces. React Query and SWR provide efficient tools for data fetching and state synchronization. Chart.js and Recharts are used to deliver clear data visualizations for analytics dashboards. Socket.io Client supports real-time chat functionality and instant notifications.

2) Backend:

The system architecture incorporates Next.js API Routes for serverless endpoints, Node.js as the runtime for backend processes, Google Gemini API for adaptive test generation and evaluation, and JWT/NextAuth.js for secure authentication and session management.

D. *Database:*

The system employs MongoDB, a NoSQL database designed for adaptable data storage, and Mongoose, an ODM framework that facilitates schema definition and validation.

E. *Deployment & DevOps*

Vercel provides a platform for deploying Next.js applications with ease and efficiency. Git and GitHub are used for version control and collaborative development. Environment variables ensure the secure management of API keys and configuration settings.

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F. Datasets:

The system maintains user profiles containing personal and educational details, secures authentication through hashed passwords, records session activity for monitoring, and enforces role-based permission structures to regulate access.

Assessment Data: User responses and scores, Performance analytics and trends, Learning Content: Course materials (videos, PDFs, presentations), Topic categorization and metadata.

IV. IMPLEMENTATION

The implementation will adopt the Scrum methodology, organized into biweekly sprints to ensure incremental progress and continuous stakeholder feedback. It will follow a modular architecture, with responsibilities divided into distinct layers: presentation, business logic, data access, and AI services.

The implementation will follow an API-first approach, with RESTful APIs designed prior to frontend development to establish clear service contracts. GraphQL will be employed for complex data queries, ensuring optimized performance and flexibility.

AI Integration Strategy: Gradual integration of the Gemini API, starting with test generation. Caching of frequently generated content to reduce API calls



Fig No 1 Role of Online Assessment Test.

V. RESULT

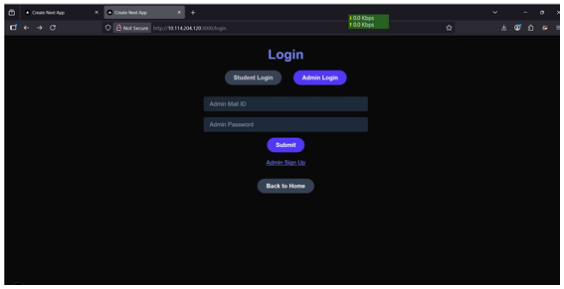


Fig. No. 2 Admin Login

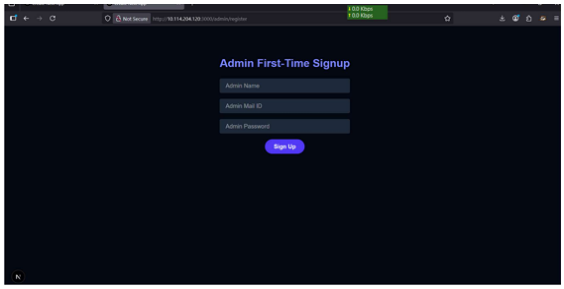


Fig. No. 3 Admin Sign Up Page

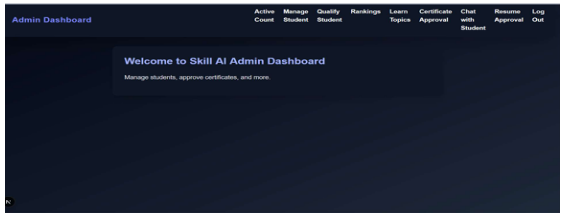


Fig. No. 4 Admin Dashboard

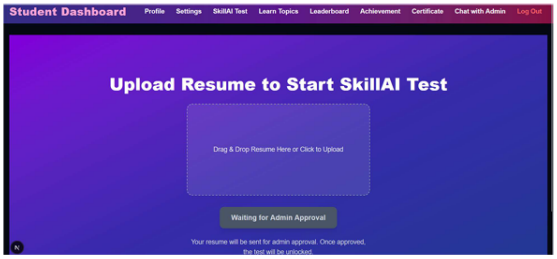


Fig. No. 5 Student Dashboard Skill Ai Test

VI. CONCLUSION

SkillAI demonstrates the powerful synergy between artificial intelligence and educational technology, creating a unified environment for skill evaluation and learning. With the integration of Google's Gemini API, the platform delivers adaptive test generation, personalized learning recommendations, and automated assessments, successfully addressing the limitations present in existing educational systems.

The system's modular architecture, with separate admin and student modules enhanced by AI capabilities, offers a scalable and maintainable solution that adapts to evolving educational needs. The integration of live features such as chat and instant assessment feedback strengthens user engagement and enables seamless communication among stakeholders.

Notable achievements include the creation of an intelligent assessment engine that generates questions tailored to context, the development of a dynamic learning management system that adapts to individual learner performance, and the implementation of an automated certification mechanism that upholds the credibility of issued credentials. Furthermore, the platform's responsive design and compatibility across devices make high-quality education accessible to a broad and diverse audience.

While the project successfully fulfills its main objectives, potential advancements may include the creation of a mobile application, the use of blockchain for secure credential verification, the application of machine learning to deliver advanced analytics, and integration with professional job portals. These upgrades would strengthen the platform's foundation, establishing it as an innovative AI-powered solution with the ability to transform how skills are assessed, developed, and validated in the modern digital landscape.

The positive user feedback and performance metrics validate the project's success in creating a valuable educational tool that benefits students, educators, and employers alike. SkillAI represents a significant step toward personalized, accessible, and credible digital education that aligns with the evolving needs of the modern workforce and learning landscape.

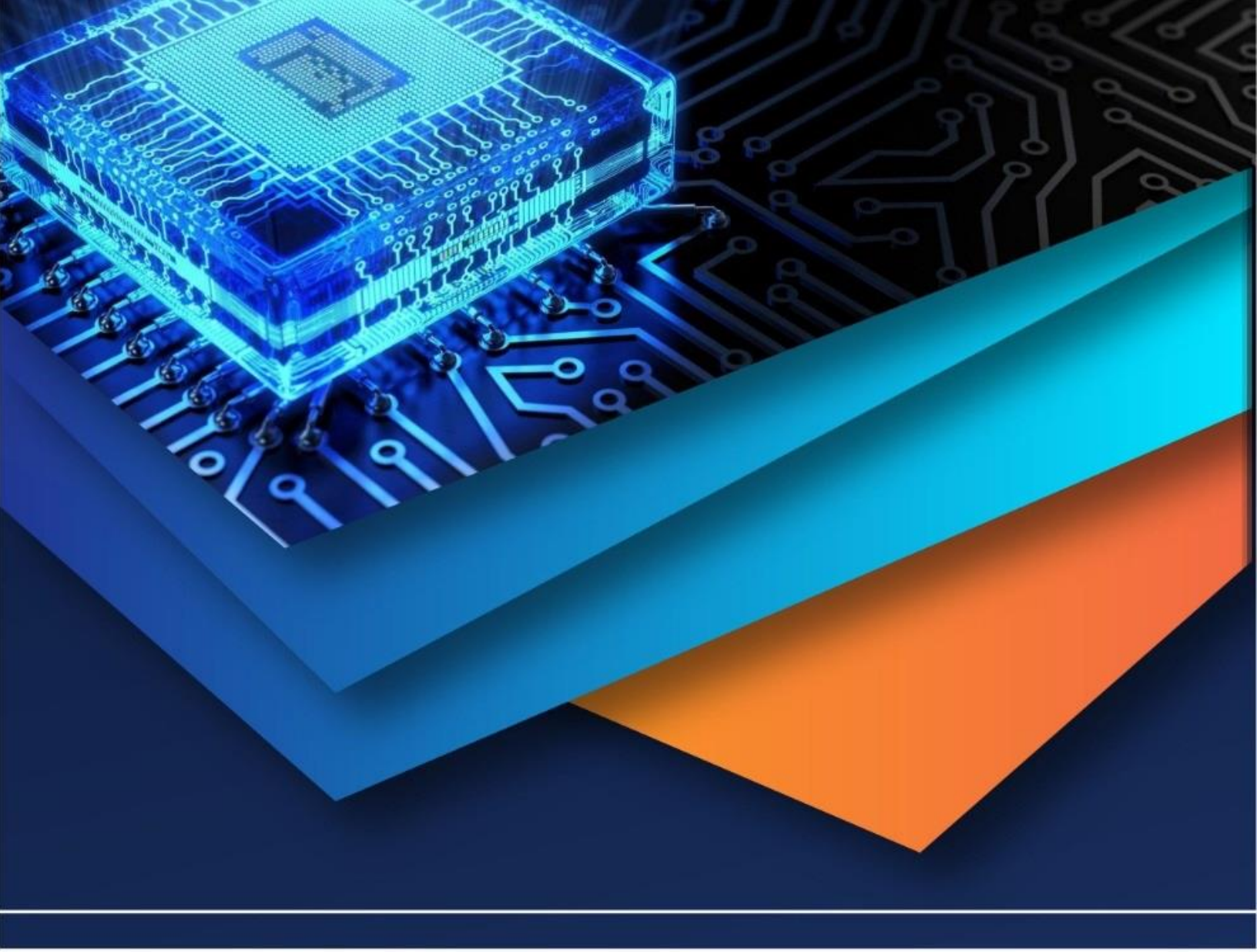
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