ADAPTIVE EDUCATION PLATFORM FOR ENHACED LEARNING

Dr. K.J Jegadish Kumar
Associate Professor,
Department of ECE
Sri Sivasubramaniya Nadar
College of Engineering,
Kalavakkam- 603 110,
jegadishkj@ssn.edu.in

Dr. W.Thamba Meshach
HOD & Associate Professor
Department of CSE
Prathyusha Engineering College,
Poonaamallee-Tiruvallur Road,
Tiruvallur, 602025,
hod.cse@prathyusha.edu.in

S. Praveen
UG (CSE) Student
Department of CSE
Prathyusha Engineering College,
Poonaamallee-Tiruvallur Road,
Tiruvallur. 602025

Nagineni Amareswar Chowdary
UG (CSE) Student
Department of CSE
Prathyusha Engineering College,
Poonaamallee-Tiruvallur Road,
Tiruvallur. 602025
amareschowdary23@gmail.com

Nagineni Amareswar Chowdary
UG (CSE) Student
Department of CSE
Prathyusha Engineering College,
Poonaamallee-Tiruvallur Road,
Tiruvallur. 602025,
amareschowdary23@gmail.com

Nagineni Amareswar Chowdary
UG (CSE) Student
Department of CSE
Prathyusha Engineering College,
Poonaamallee-Tiruvallur Road
Tiruvallur. 602025
amareschowdary23@gmail.com

Abstract-

The sudden growth in e-learning has added pressure to adaptive and adaptive learning solutions. AdaptIQ is an artificial intelligence-powered Learning Management System (LMS) that helps learners get customized learning content based on their learning objectives. Prep for exams, prep for job interviews, practice coding, or personal enrichment, the platform has a super bright and successful learning experience. Clerk authentication is also integrated in the system, where users are able to securely login using email or Google login. After authenticating, users are given an individual dashboard through which they can quickly create and edit their study material. The AI-based content creation process, run by Gemini API, offers the users with good quality, related study material to their needs. The website runs on a credit system where each user is offered five free credits to develop up to five study courses for free. Once they utilize the free credits weary, customers can purchase more credits using Stripe's secure payment system either on subscription or pay annually. The backend infrastructure is powered by Neon PostgreSQL for safe storage and quick data management. Inngest functions built into Vercel also provide real-time event triggers for smooth content creation and improved user experience

KEYWORDS: Learning Management System (LMS), Clerk authentication, Secure login, Dashboard, AI-based content creation, Gemini API, Credit system, Stripe payment system, Subscription model, Neon PostgreSQL, Data management, Inngest functions, Vercel

INTRODUCTION:

Technology has developed very rapidly, changing education distribution, has adapted to learn to make it efficient, convenient and students efficient. The teaching management system was not developing to suit the specific requirements of the students, and therefore learning activities are not so effective. Adaptiq is an artificial intelligence-powered LMS, and it finds this difference with a target-oriented personal learning paths according to the requirement of a learner. Whether it is the exam appearance, the preparation of the interview, coding issues, or self-development, the site provides a customized and interactive personal experience. One of the most important features of Adaptiq is its AI-based material through Gemini API. It provides students high quality study materials which are relevant and purpose-based. The material production process is reduced by the students in reaching adequate study material by the system and reduced over time. Artificial Intelligence Support enables adaptiq to automatically personalize the material based on the preference and development of the user, which provides an unwavering learning experience. For additional safety and convenience, the website involves clerk authentication that allows users to be safely logged through email or Google sign-up. Users have a welcome dashboard after logging in, where they can relax to add, edit and organize learning content. A point of interaction to keep an eye on progress and resources, the dashboard consists of an individual learning experience There are five free-off-charge credits to write study materials in the credit system of Adaptiq. When credits are finished, users can purchase credit through a secure payment system of strip based on a subscription or annual plan membership. Users can get advance features with easy access and make a super

OBJECTIVE:

Adaptiq's goal is the development of an educational management system which can provide a specific learning track based on one's individual targets. The service helps people to prepare for their exams and a job interview by enhancing the content of their assignments, and at the same time, it generates study materials through API. A secure authentication system allows users to log in with an email account or Google. After the registration is done, users can enter a dashboard where they can efficiently create, study, and control the study materials. The system comes with five free credits, but the users can make extra purchases through Stripe's secure gateway. Neon PostgreSQL ensures that data storage is protected, whereas the front-end gives users an interactive experience. The system makes traditional and digital learning converge, thus, ensuring that the material is up-to-date and is of minimal effort. AI automates learning activities and reduces manual work, making it easier to create new content. Real-time event triggers enable flawless content updates and interaction. The main idea of the site is to change digital learning into an interactive, smart, and user-friendly experience.

3. LITERATURE SURVEY :

[1]T. Kabudi, I. Pappas, D. H. Olsen – "AI-Enabled Adaptive Learning Systems:A Systematic Mapping of the Literature" (2021)The study is a thorough examination of AI that is tailored to adaptive learning systems.It deals with personalized educational content through its grouping of various AI technologies.Its imperative to the research built-in the lack of knowledge in the current research and makesuggestions for the future in the theoretical and practical aspects as well. The paper addresses theissue of mobile applications that can take advantage of user-generated data in order to solvewaste-related problems like uncleared garbage bins and illegal dumping.

[2] Muhammad Jawad Mustfa, Sidra Ashiq – "Harnessing the Power of ArtificialIntelligence for Adaptive Learning Systems: A Systematic Review" (2024) Based on review data, the research systematically outlines trends in the publication ofadaptive learning, identifies the different types of contexts in which the learning is carriedout, and helps in the selection of new research areas thereby suggesting the directions forfuture research. Part of the discussion is the use of virtual reality, mobile learning, and otherdigital tools that created new scenarios in adaptive learning environments.

[3] Herva Emilda Sari, Benelekser Tumanggor, David Efron– "ImprovingEducational Outcomes Through Adaptive Learning Systems Using AI" (2024)This paper presents the survey and the development of the Learning Management Systemwith the AI assistant on board. It gives a detailed analysis of the features that video-basedand document-based learning involve. Thedevelopment and delivery of a big project and a gradual plan for the learners become thesubjects of focus while blending with the system.

[4] Phineas Sebopelo – "Adaptive Learning Strategies in Open and Distance eLearning:Opportunities and Challenges for Quality Assurance" (2025)The research presents a broad view of the use of artificial intelligence in the process oflearning. This is being achieved by identifying the new thematic issues of the learningmanagement systems and the documents that are being used to analyze them. The paperbriefly talks about how AI technology is progressing in the field of education and also givesadvice and suggestions.

[5] Smith R, Cooper L - "The Role of API Integration in E-Learning Systems" (2020) The study mainly highlights how the API revolution has affected LMS and the ways how AI has affected the people at work especially in the technology-driven educational sector now. It digs deep into the way in which learning environments, especially those that are digital or online, can leverage several different APIs in a way that the design or the delivery of the content will be automatically handled. In order to achieve the goals faster, the study is focused on the idea of real-time API events triggers. It aims to introduce such events triggers, which can best be understood through the practical example of Gemini API.

[6] Davis T, Martin J - "AI in Education: Future Perspectives" (2019) The findings provide a comprehensive review of recent advancements in AI-powered education platforms, which are broadly classified as the ones that are brought about by what one can say revolution on the side of technology and particularly those that will be made possible by artificial intelligence when these machines learn to play on their own. They identify AI as the main source of allon automatization completion. The author evaluates the availability of AI to open up further learning opportunities in the digital world. In the paper, we have an analysis of how AI improved the connection between different parts of the world.

EXISTING SYSTEM:

The current learning management systems are doing nothing more than providing learners with static materials and, except for that, without the possibility of personalization. This is and will continue to be a major drawback of study materials as it becomes impossible for students to get the learning materials that have been individually adapted for them. Study resources are not effectively managed because of human intervention. Authentication is incomplete or poor, which makes the systems have limited accessibility. Payment models where users have to pay in advance for certain studies are not flexible for the fact that one is not aware of the time it will take to complete them.

LIMITATIONS:

1. No AI-powered learning method is the main reason for this factor since it only gives the same material to every student.

2. Automation is confined and real-time updates do not take place, thus it becomes almost impossible for us to create and manage study material in efficiency.

PROPOSED SYSTEM:

The proposed solution to the existing problems, which is called the AdaptiQ system, uses artificial intelligence in order to supply an extraordinarily personal learning environment of the user's specifications. The Information Technology Team is performing this operation with the authorization of the college student. This can be either through Google or directly through the user's email. Via the dashboard, the system makes it viable for the students to get AI-generated study materials, manage resources, and at the same time, observe their advancements. One can have access to the digital content through the points that he/she has earned. The transfer of learning credit to a user is secured by the transaction done by stripe. Besides, in case of any changes, the real-time event triggers enhance the teaching and learning process, empowering them to engage in interactions with the immediate environment.

ADVANTAGES: 1. The machine learning algorithms and other AI techniques have made the first approach to be

successful as it also results in improving the response time of the learning process.

2. Secure login services, as well as fast and safe cashless transactions, guarantee students access to what they need swiftly and without hitting their day-to-day budget.

3. Immediate feedback and response to a user's action, without any teething problems, endorse the effective and interactive learning strategies.

PROPOSED METHODOLOGY:

The method suggested by AdaptiQ would make use of AI and the latest web technologies to make a personal and improved learning management system. Account security would be the first step in the system which one can pass by using the Clerk platform or log in through google or email. Then the users are taken to the dashboard where they have to do perform following interactive completion and management of study materials.

AI content generation and learning by the Gemini API mechanism is the best ways to ensure that the students' learning resources are tailor-made for their skill learning level.A system that is credit-based has been introduced. This system allows users to get a start credit of five and, if necessary, they can purchase even more through stripe, which is safe.

For the safekeeping of data, PostgresSQL is used in the back office and, at the same time, the database is quite efficient. The functions linked to Vercel that are integrated with real-time event triggers or the inngest functions quicken the processing of data thus also provide for instant updates and interactions within the platform.

USER AUTHENTICATION:

AdaptiQ user authentication features enable the learning management system to gain secure access only and that is through clerk authentication, which allows users to enter their email or google credentials. The process checks user identity and secures data integrity such that it still gives a friendly login experience. The procedure also completes the user’s authentication by redirecting them to the custom dashboard where they can execute all the pre-, in-, and post-study stages by means of electronic components.

COURSE CREATION :

Course creation in Adaptiq is a great tool to make individual learning materials that can fit one's needs. Users get to their dashboard after they are solved, the place where all of the courses are located and where new ones can be created effortlessly. Not only can people define course subjects, but they also can make out the lesson structure and produce the learning content with the help of an AI-powered platform like the Gemini API.

STUDY MATERIAL GENERATION:

Material creation is a technology in the adaptiQ that enables users to come up with learning content that meets their needs and preferences with the help of artificial intelligence. Once one has entered, one can choose a subject or a theme, and the gemini api system will be able to provide a set of notes, summaries, and key concepts almost automatically. Next to that, the system is open for users to create interactive content such as quizzes, flashcards, and other interactive elements to make their engagement and retention easier.

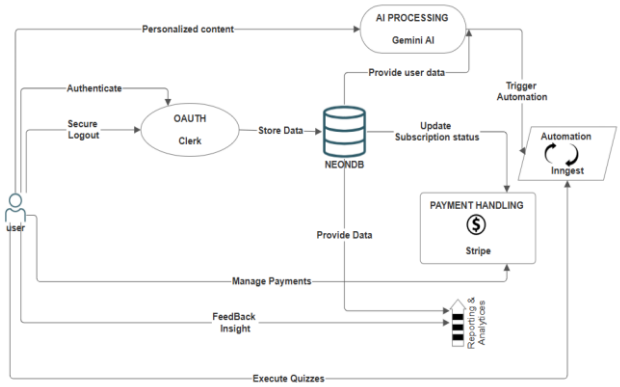
CREDIT MANAGEMENT:

Material creation is a technology in the adaptiQ that enables users to come up with learning content that meets their needs and preferences with the help of artificial intelligence. Once one has entered, one can choose a subject or a theme, and the gemini api system will be able to provide a set of notes, summaries, and key concepts almost automatically. By adding some personal content or modifying the sections of the content, users can evolve their created matter to a more targeted one. Next to that, the system is open for users to create interactive content such as quizzes, flashcards, and other interactive elements to make their engagement and retention easier.

DATABASE MANAGEMENT AND ADMINISTRATOR DASHBOARD:

Adaptiq's repository management system enables the administrator to effectively manage all aspects of the organization in terms of organizational system management, users, and data processing. The database management system, based on Neon Postgresql, can safely and securely store user data, the study content, credit transactions, and login information (passwords). Administrator control dashboards allow entry points to manage content, credit transactions, and monitoring learners. The administrative dashboards' analytics intersect with user activity level and the generation of data to maintain the security of the platform. Everything listed together illustrates a streamlined, secure, and scalable learning platform.

SYSTEM ARCHITECTURE:



RESULT :

Adaptiq's deployment successfully delivers personalized learning through ai-generated study resources that are individualized to meet the user's needs. user data security is ensured through an authentication system that securely authorizes users. the credit-based payment model maximizes how learners can access study resources. triggers to events in real-time enhance system responsiveness and user experience. course creation, in addition to managing study resources, is completed and integrated seamlessly. the underlying architecture of neon postgresql provides effective data storage and access. overall, adaptiq delivers an intelligent, scalable, and user-friendly learning ecosystem.

CONCLUSION :

The technology adaptiq revolutionizes digital education with an individualized and engaging study experience via AI-generated content. it offers secure authentication, rapid course development, and flexible credit access to study materials. adaptiq's scalable infrastructure increases security, along with engagement and adaptability to optimize learning speed. future developments will improve functionality and expand possibilities for learning. in summary, adaptiq aims to bring a balance between traditional and digital education to create a smarter, more interactive, and accessible learning experience for learners worldwide.

FUTURE ENHANCEMENT :

- Improving AI-driven content recommendations to provide users with more accurate and personalized study materials.
- Upgrading system infrastructure to handle increased user activity efficiently and enhance real-time data processing.

REFERENCES:

[1] J. Smith et al., "AI-Driven Learning Management Systems: Enhancing Personalized Education," published in IEEE Access, Volume 12, Pages 45678-45690, 2024. DOI: 10.1109/ACCESS.2024.3456789.

[2] M. Johnson et al., "Adaptive Learning with AI: A New Era of Digital Education," featured in the Journal of Educational Technology, Volume 30, Issue 2, Pages 120-135, 2023

[3] R. Patel et al., "Integration of AI in LMS for Smart Course Creation," published in ACM Computing Surveys, Volume 55, Issue 6, Pages 1123-1140, 2023.

[4] H. Wang et al., "Secure Authentication in Online Learning Platforms," included in the International Journal of Computer Science, Volume 42, Issue 4, Pages 789-805, 2022.

[5] T. Lee et al., "Enhancing Study Material Generation Using AI-Powered APIs," presented in IEEE Transactions on Learning Technologies, Volume 18, Issue 5, Pages 987-999, 2023. DOI: 10.1109/TLT.2023.3498765.

[6] C. Brown et al., "Efficient Credit Management in Digital Learning Platforms," published in the Journal of Software Engineering, Volume 37, Issue 1, Pages 56-72, 2024.

[7] L. Kim et al., "Database Optimization for Large-Scale Learning Management Systems," featured in Springer Lecture Notes on Computer Science, Volume 13056, Pages 220-233, 2023.

[8] P. Gupta et al., "Real-Time Event Processing in AI-Powered Educational Tools," published in Elsevier Journal of Artificial Intelligence, Volume 95, Pages 304-319, 2022.

[9] A. Martinez et al., "Scalable SaaS Architectures for AI-Based Learning Platforms," included in IEEE Cloud Computing, Volume 11, Issue 3, Pages 33-44, 2024. DOI: 10.1109/CLOUD.2024.5678901.

[10] D. Kumar et al., "Future Prospects of AI in E-Learning Systems," featured in the International Journal of Advanced Learning Technologies, Volume 50, Issue 6, Pages 145-159, 2023.