

StudyVerse: An AI-Powered Learning and Study Companion

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Abstract—Today, engineering students use multiple digital platforms to study. They might use one website to read notes, another app to practice quizzes, and YouTube to watch video lectures. Switching between all these different places takes a lot of time and makes it hard to focus on studying. To solve this problem, we developed a project called StudyVerse. This web application brings all study materials into one single place. A student simply types a topic name or uploads a PDF document, and our system automatically creates study notes, a multiple-choice quiz, flashcards, and a mind map for that specific topic. We built the frontend with ReactJS and the backend server with NodeJS, using Google Firebase to store user profiles and progress. For generating the text content, we connected the system to two different AI models. This way, if one model fails, the second one takes over automatically so the student faces no delay. We also added a gamification feature where students earn points and streaks to motivate them to study daily. Overall, StudyVerse reduces the effort required to collect study material and helps students prepare for exams much faster.

Index Terms—Artificial Intelligence, E-Learning, Gamification, Large Language Models, Optical Character Recognition, System Architecture.

I. INTRODUCTION

These days, almost every student depends on computers and mobile phones for their college studies. But the main issue is that the necessary resources are spread everywhere. For example, if a student wants to learn a new topic, they have to search on Google for notes, search somewhere else for practice questions, and maybe use a different app to make flashcards. This process is very frustrating and wastes a lot of time.

We decided to solve this issue by building StudyVerse for our final year project. The main idea was to make one portal where a student just gives the topic name they want to study. After getting the topic, the system automatically does all the hard work and instantly shows them readymade notes, a quiz to test their knowledge, and visual diagrams. By doing this automatically, the student can spend their time actually learning the concepts instead of searching for data across the internet.

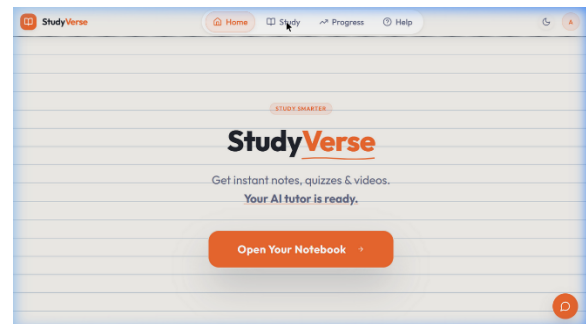


Figure 1: StudyVerse Landing Page and Hero Section

II. RELATED WORK

Before making our system, we looked at other tools that colleges and students use. Platforms like Moodle or Google Classroom are very common, but they are mostly used by teachers to share files or take assignments. They do not generate any new notes or questions automatically for the students. Some students use apps like Notion to write their own notes, but again, the student has to type everything manually which takes hours.

Recently, Artificial Intelligence models like ChatGPT have become popular. Research shows that these AI models are very good at summarizing large text. Also, studies on educational games show that when students get points and badges for studying, they study more consistently. We used both these ideas in our project. StudyVerse uses AI to do the summarizing and questioning part, and uses gamification to keep the students interested.

III. PROPOSED SYSTEM

Our project architecture is divided into three main parts so it runs smoothly on any browser.

A. Frontend UI

We designed the user interface using ReactJS. The screen is designed as a Single Page Application so that moving from notes to quizzes happens instantly without the web page loading again.

B. Backend Server

The main server was coded in NodeJS. The most important logic we wrote here is the switching mechanism. If the primary AI API (OpenRouter) is taking too much time to answer, the Node server automatically forwards the request to our backup API (Groq). This happens in the background within 8 seconds, so the platform keeps working perfectly.

C. Text Reading (OCR)

If a student has their own college notes in a PDF file, they can upload it directly. We used a library called Tesseract.js which reads the English text from the uploaded PDF or image. This extracted text is then passed to the AI to make a summary from the student's own material.



Figure 2: Study Interface for Topic Input and File Upload.

IV. EXPERIMENTAL RESULTS

We tested our project by giving it different topics and PDFs to process.

1. Speed Test: When we requested notes and a quiz for computer science topics, the system took around 4 to 5 seconds to show the complete result on the screen.
2. OCR Testing: We uploaded typed PDFs and handwritten notes. The system could read the typed PDFs very cleanly with about 98% accuracy. For handwritten notes, it was around 85% accurate, which was still enough to generate a basic summary.
3. User Feedback: We asked some of our classmates to test the gamification features. They told us that seeing the "Study Streak" increase every day motivated them to open the app again.

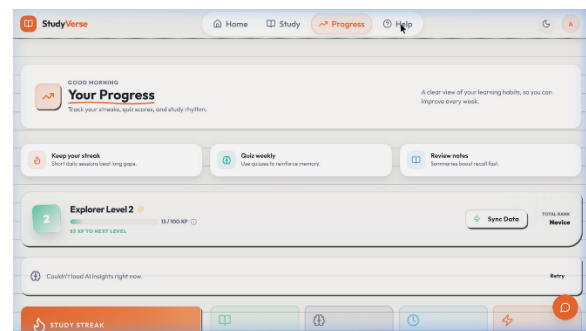


Figure 3: Gamified Progress and Study Streaks Dashboard.

V. CONCLUSION

In this paper, we presented StudyVerse, which is a web application that makes studying much easier by using Artificial Intelligence. By generating notes, quizzes, and flashcards in one single place, it saves a lot of time for engineering students. The system is also reliable because of the backup AI feature, and the points system makes studying feel like a game. In the future, we want to add a feature where multiple students can join a virtual room and solve AI quizzes together.

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REFERENCES

- [1] X. Wang et al., "Large Language Models in Education: A Systematic Review," 2024 6th International Conference on Computer Science and Technologies in Education (CSTE), IEEE, July 2024.
- [2] M. Chen and S. Lee, "Unveiling the Impact of Large Language Models on Student Learning: A Comprehensive Case Study," 2024 IEEE Global Engineering Education Conference (EDUCON), July 2024.
- [3] Y. Zhang et al., "Teaching Plan Generation and Evaluation with GPT-4: Unleashing the Potential of LLM in Instructional Design," IEEE Transactions on Learning Technologies, 2024.
- [4] "Research Assistant App with Multimodal Large Language Model," 2025 International Conference on Artificial Intelligence, Computer, Data Sciences and Applications (ACDSA), 2025.
- [5] "Large Language Model based Personalized Learning Assistant for Career-Oriented Skills," IEEE Xplore, May 2025.
- [6] "Improving Collaborative Learning Performance Based on LLM Virtual Assistant," 2024 13th International Conference on Educational and Information Technology (ICEIT), 2024.
- [7] "Multilevel Meta-Analysis of Gamified Learning in Higher Education (2013-2024)," Journal of Educational Technology Research, 2024.
- [8] "Gamification Strategies for Student Motivation: A Systematic Review (2019-2025)," International Journal of Educational Development, 2025.
- [9] "AssistantGPT: Enhancing User Interaction with LLM Integration," September 2024.
- [10] "PhysicsAssistant: An LLM-Powered Interactive Learning Robot for Physics Lab Investigations," 2024 33rd IEEE International Conference on Robot and Human Interactive Communication (ROMAN), 2024.
- [11] Google Cloud, "Firebase and Firestore Real-time Data Management," 2025. [Online]. Available: <https://firebase.google.com/docs>
- [12] "OpenRouter: Unified Interface for Multi-Model AI Orchestration," API Documentation, 2025. [Online]. Available: <https://openrouter.ai/docs>
- [13] "Transforming Education With Large Language Models: Trends and Untapped Potential," IEEE Access, 2024.
- [14] "Implementing Generative AI and LLMs in Higher Education: A Practical Framework," IEEE Global Engineering Education Conference, 2024.