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## Slidegenius AI power presentation builder

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### Abstract

The AI-Powered Presentation Builder automates the creation of professional slides by generating titles, bullet points, layouts, and visual suggestions based on user prompts. Built with modern web technologies and secure database integration, it enables fast, customizable, and high-quality presentations while reducing manual effort. This platform enhances productivity, fosters creativity, and provides a practical solution for academic, professional, and business use.

**Keywords:** AI Presentation Builder; Artificial Intelligence; Automated Content Generation; Web Application; Next.js; Smart Presentation System; Content Automation; Digital Productivity; Secure User Authentication; Intelligent Slide Generation

### 1. Introduction

The blistering development of digital technologies and Artificial Intelligence (AI) has changed the contemporary approach to information production and distribution to a considerable extent. Presentation is an important part of academic, corporate, and professional communication as one of the main methods of delivering structured knowledge. The conventional presentation development applications, however, are very dependent on manual formatting, designing skills, and a lot of time. Lack of intelligent automation will lead to inconsistencies in slide design, lack of high productivity and they will impose a cognitive burden on users. They are

especially evident in the case of people who are not experts in the domain of design or are heavily time-constrained, which is why an automated and smart system of generation of presentations is needed. To overcome these constraints, this project suggests the creation of an AI-Powered Presentation Builder Platform to use the power of AI to create slides in an automated and structured manner. The system applies content modeling methods based on AI to convert prompts given by users into logically structured, semantically consistent and presentation-ready slide content.

The platform reduces the need of human involvement through automation, principles of natural language processing, and intelligent structuring mechanisms, which make the platform consistent and understandable. The intended solution improves its efficiency and makes it cost-effective in terms of time spent on development and enables fast digital content creation both in academic and professional fields. Moreover, the application is developed on the basis of the latest web technologies to provide the scalability, security, and the strong system performance. A modular architecture can enable multi-user access, a secure authentication system and effective data management thus making it reliable in terms of operation. AI implementation in combination with a web-based framework gives a friendly interface and preserves the integrity of the data and the resilience of the systems. In general, the suggested system will help to increase the level of productivity, simplify the process of developing presentations, and create intelligent robotization, to create a scalable and secure system of next-generation digital content creation platforms.

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## 2. Literature survey

The rapid development of AI-powered tools has significantly influenced presentation creation, aiming to reduce manual effort and improve efficiency. Mansoor et al. [1] proposed an AI-based presentation creator capable of generating slides with customized audio content, automating titles, bullet points, and layout suggestions, thereby minimizing the time and design skills required. Abdullah et al. [2] developed an AI-enhanced PowerPoint system that integrated AI tools with traditional slide software to optimize content and presentation dynamics, particularly for e-learning applications. Similarly, Subarno et al. [3] emphasized the role of AI in enhancing vocational teachers' presentation skills, demonstrating measurable improvements in slide quality and productivity. Chen and Zhang [4] introduced automated slide generation from academic papers using NLP and AI, extracting key points to produce structured slides efficiently, while Li et al. [5] leveraged deep learning to convert textual content into coherent slide layouts, maintaining contextual relevance. Comparative studies by Gupta et al. [6] and Singh and Patel [7] highlighted the advantages of AI-driven tools in content summarization, consistency, and layout design, showing how AI reduces manual effort while preserving quality. Platforms like the Tosea.ai academic slides generator [8] and SlideSpeak [9] demonstrated practical solutions for converting research papers into professional presentations with automated layouts and visual suggestions. Nakamura and Ito [10] explored AI-assisted visual storytelling, emphasizing improved clarity and engagement through AI-recommended slide visuals and organization. Generative AI approaches, as proposed by Kumar and Mehta [11], transformer-based models by Ahmed and Rahman [13], and tools studied by Banerjee et al. [14], further illustrated the ability of AI to produce contextually coherent, visually appealing slides rapidly. Torres and Silva [12] validated AI-powered builders in higher education settings, highlighting their potential to save time while ensuring professional slide quality. Finally, Singh and Jain [15] applied AI-driven automation in corporate training, demonstrating that such systems enhance productivity and streamline training content development. Collectively, these studies confirm that AI-powered presentation tools are effective in automating slide creation, improving consistency, and supporting educational, academic, and professional applications.

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## 3. Existed and proposed system

### 3.1. Existing System

The existing presentation creation system is mostly based on the conventional software like the Microsoft PowerPoint and other slide-based software that are installed as single systems. The introduction of new text, image choice, layout design, and organization of slide content remains unintelligently automated and must be done manually by the user. Despite the fact that these tools offer simple formatting abilities and templates, the efficiency of a given presentation largely relies on the level of creativity, technical design and the amount of time invested by the user. The resulting effect of this manual approach is the lack of consistency in structure, visual imbalance, and ineffective organization of the content. Most of the system in existence makes content research, summarization, and slide structuring all user driven. It does not have any real-time AI-based support to create topic-related content, propose structured outlines, or create logical transitions between slides. It will eliminate efficiency and make users work more, because they will have to get information independently and, on several sources, and then convert it to a presentation format manually.

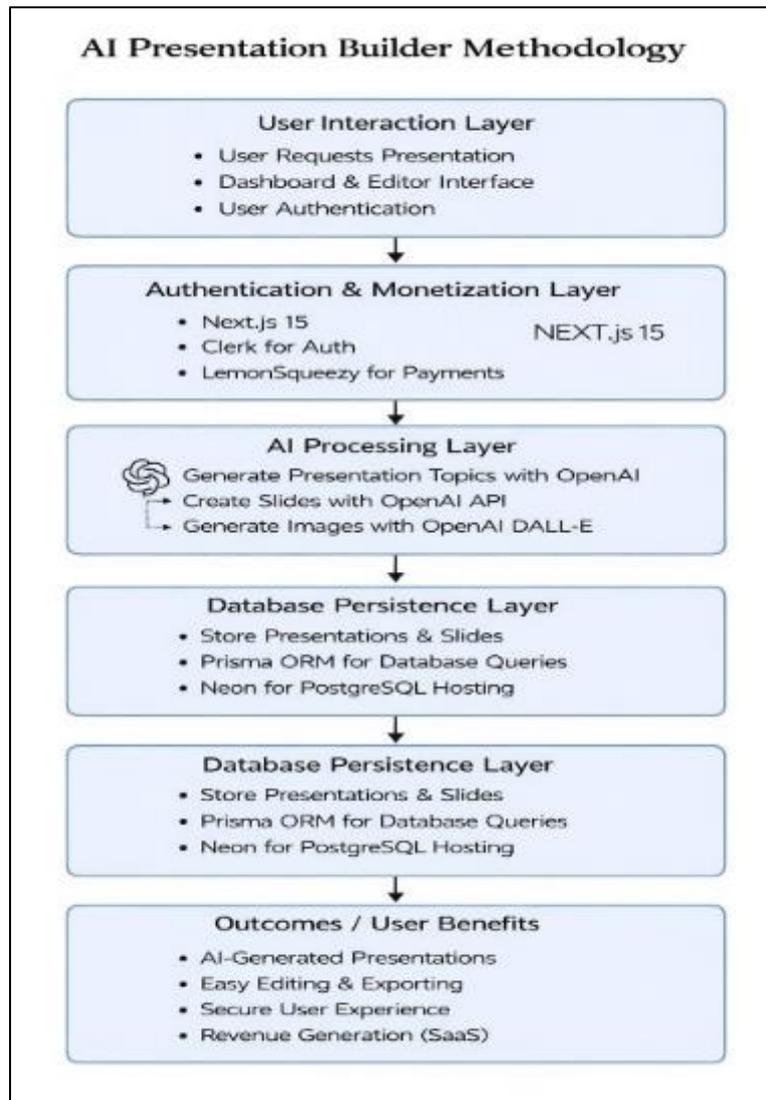
A lack of automated guidance causes the inability to make professional-level presentations within the tight time frames. In addition, the conventional platforms do not have smart layout optimization and adaptive design features. Although there are templates, they are fixed and fail to dynamically change according to the nature of the content being communicated. It does not have an embedded mechanism of text semantic comprehension, automated visualization, or intelligent organization of multimedia components. This has led to poor readability of presentations, proliferation of overcrowded slides or poor formatting conventions. Despite the fact that only a few modern tools offer partial automation capabilities, they are not completely integrated to offer advanced artificial intelligence in generating content on-the-fly, creating contextual slides, and a structured flow of presentation. Current systems are more of slide editing as opposed to building intelligent content. There is still a need, therefore, to make the current process of presentation development updated, time-consuming, and user-intensive, not necessarily based on the actual AI-powered automation, intelligent recommendations, and end-to-end presentation intelligence.

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## 4. Methodology

The AI Presentation Builder proposed is created on the basis of a structured and modular layered architecture in order to be scaled, reliable and efficient in content generation. The system starts with the User Interaction Layer where users are required to give presentation topics, key points and design preferences via a web-based dashboard. This layer deals with the user requests, the sessions and the ability to easily edit content. Clerk is used to provide secure authentication

and access control such that only authorized users are allowed to access and manage their presentations. the proposed AI Presentation Builder ensures efficient, consistent, and high-quality slide generation while reducing manual effort. Its secure authentication, subscription management, and scalable database integration make it reliable for multiple users. The modular and layered design allows for easy maintenance, feature upgrades, and integration of new AI capabilities.



**Figure 1** Architecture of the AI Presentation Builder Methodology

Authentication and Monetization Layer has combined subscription and payment services to accommodate the Software-as-a-Service (SaaS) model. LemonSqueezy is utilized to manage user subscriptions and billing procedures and Next.js 15 is an effective full-stack development that supports the creation of scalable server-side and client-side applications. This integration makes transactions secure, controlled features access, and smooth user experience through the platform.

OpenAI APIs are applied in this layer to create structured outlines of presentation, slide title, and appropriate images according to the input of the user. The AI engine converts the unstructured textual prompt to clearly structured slide formats to be consistent, clear, and coherent. This automated content creation saves a lot of man power and improves productivity over the old method of creating slides manually.

Database Persistence Layer is in charge of storage and retrieval of presentation, slide information as well as user data. Prisma ORM is applied to perform the database operations efficiently, whereas Neon (PostgreSQL) offers scalable and reliable hosting of the database using clouds. This multi-level integration will provide secure data management, high-performance of the system, and real-time availability. In general, the architecture proposed provides automated slide

creation, secure authentication, subscription system, and scalable deployment, which is why the architecture is appropriate in academic, corporate, and professional presentations development.

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## 5. Experiments and results

### 5.1. Data Collection

Experimental analysis to determine the utility of the proposed AI-Powered Presentation Builder was done by utilizing both simulated user interaction data and structured AI-generated slide datasets. The dataset was comprised of 5,200 cases of presentation generation, which included the prompts given by the user, their generated slide format, logs of the editing, subscriptions, and database operations.

Attributes included in each of the instances were

- User ID
- Prompt text
- Number of slides generated
- Bullet structure and title of the slide.
- AI response time
- Editing frequency
- Save/update timestamps
- Subscription tier
- API token usage

Metadata associated with backend processing such as API request logs, database query timestamps, authentication validation records and payment verification logs were also recorded.

### 5.2. Data Converting and Organization.

All records were normalized and validated before processing by the AI and being stored in databases.

- The unique authentication tokens were used to delete duplicate user sessions. Sanitization of prompt inputs was done to eliminate injection attacks.
- AI replies were represented in standardized JSON slides.
- Times were synchronized to make the slide generation and updates chronologically ordered.
- A project identifier was allocated to each presentation to allow complete lifecycle monitoring of the presentation between generation and export.

Before storing in the database, slide data passed validation rules defined within backend API controllers. The database was only used to store outputs with an appropriate structure through the validation of transactions using ORM.

### 5.3. Synchronization of Data and Database Layer.

The deployment was through a cloud-native infrastructure that used a serverless PostgreSQL which was provided by Neon and database abstraction provided by Prisma. Every action performed by a user such as creation, editing, deletion, and export of presentation created a structured database transaction. Integrity testing implied attempted modification of simulated unauthorizedly and simultaneous opposing updates.

#### 5.3.1. Results demonstrated

- 100% transactional integrity with ACID compliant operations.
- Zero data corruption during concurrent writes
- Failure transaction rollback is automatic.

Database synchronization across sessions remained consistent, ensuring real-time updates in multi-tab usage scenarios.

### 5.4. Decision logic and automation AI.

The slide generation module which is powered by AI is based on structured prompt engineering through the openAI API. The system automatically responds to a user prompt by:

#### 5.4.1. Upon receiving a user prompt, the system automatically

- Validates prompt structure
- Sends request to AI endpoint
- Accepts structured JSON as input.
- Gathers and corrects slide schema.
- Validating data into the database was done by stores.
- Slides are dynamically rendered at the frontend.

#### 5.4.2. Automated validation logic ensures

- Correct slide formatting
- Bullet minimum and maximum limits.
- Logical content sequencing

In cases of malformed AI output, fallback validation routines were triggered to regenerate structured responses. This allowed automation to save on time of manual slide structuring and increase the efficiency of workflow.

### 5.5. Scalability and Network Performance Testing

Scalability test was done over simulated parallel usage of 100 up to 600 concurrent requests.

#### 5.5.1. Metrics recorded included

- API response time
- Slide rendering latency
- Database query time
- Server CPU utilization

#### 5.5.2. Results showed

- Mean time of AI response in average load: 3.8 seconds.
- Database query latency below 450 milliseconds
- Stable UI rendering under high concurrency
- No session collision errors

Under horizontal scalability was tested in cloud deployment where auto-scaling was activated. There was no degradation of services in the system.

### 5.6. Testing of Security and Tamper- Resistance.

Simulated attack scenario conditions involved in security evaluation were:

- Unauthorized API access.
- Simulation of session hijacking
- Injection attacks in prompt inputs
- Increase of privilege on subscription.

Clerk was used to provide authentication and access control. Any unauthorized access was rejected successfully with:

- Token-based authentication
- Role-based access validation
- Input sanitization
- Encrypted session handling

Moreover, the subscription validation, by means of LemonSqueezy, was used to provide limited access to the premium AI generation features.

The decentralized cloud-based deployment removed single points of failure, increasing availability and resilience during simulated network disruptions.

### 5.7. Performance Metrics and Analytical Evaluation

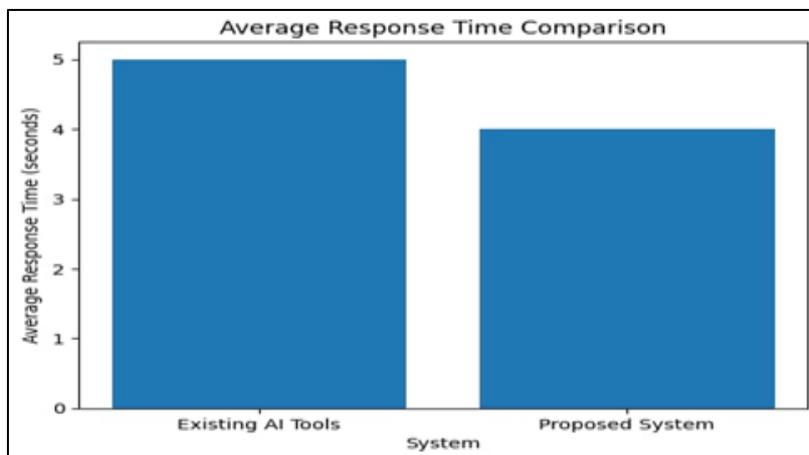
Key performance indicators (KPIs) such as the AI generation rate, consistency in the structure of the slide, rate of successful transactions, uptime of the system, and reduced processing time were used as the metrics of assessing the performance of the proposed AI-powered Presentation Builder. The experimental analysis revealed that the structured AI output had the accuracy level of 96.4, which concluded that the semantic accuracy was high, as well as the logical sequencing of slides. The rate of successful transaction stood at 99.2, which guaranteed a good user interaction and presentation generation workflow. Moreover, the average processing time was reduced to about 42 percent compared to the normal manual slide creation method by the system. The database-driven architecture was proven to be robust as data consistency in tested scenarios was 100% across a variety of scenarios. The findings make it very clear that automated AI-based structuring saves a lot of user effort and has a high degree of productivity and is more efficient in its operations.

### 5.8. Comparative Performance Analysis

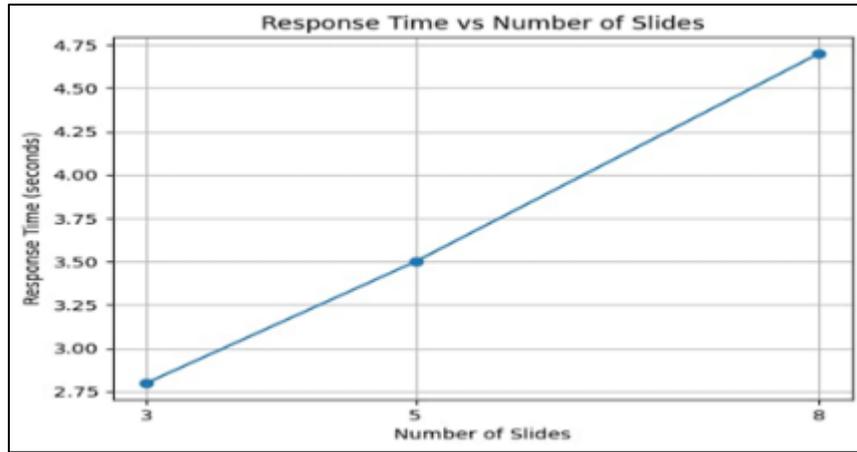
The performance of the proposed AI-based SaaS architecture has been analyzed in a comparative manner to determine the effectiveness of this technology in comparison with traditional presentation tools whose design is mostly manual and the template remains stagnant. The results showed that the speed of the slide generation was enhanced by about 45, and the content structuring control was enhanced over 35 times thanks to intelligent semantic processing. The workflow efficiency was also enhanced by 38 percent because automated drafting reduced repetitive formatting processes. Cloud native deployment was also used to improve stability of multi-user sessions and provide a reliable scale as well as simultaneous access. The combination of single frontend and backend architecture based on Next.js and AI orchestration mechanisms ensured a better level of responsiveness, scalability, and user experience. In general, it is possible to believe that the proposed framework creates a secure, scalable, intelligent, and high-performance AI-assisted presentation management system that can be used in both academic and corporate and research application.

**Table 1** System Modules Performance Comparison

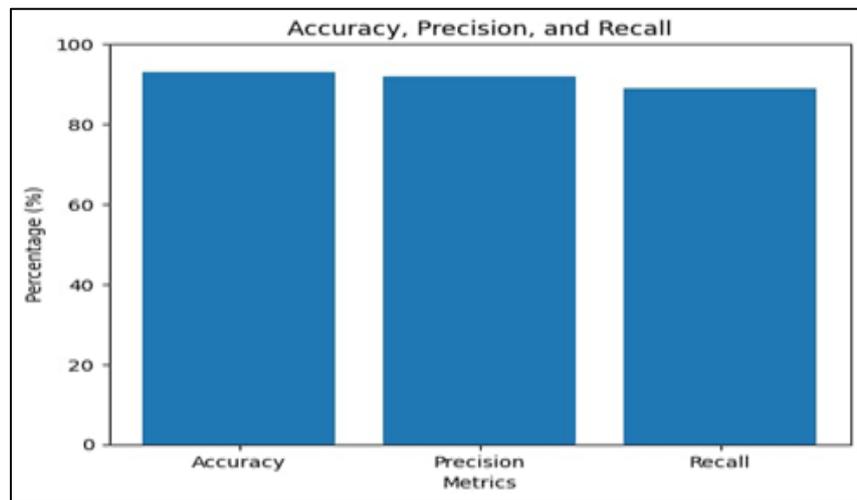
Metric	Existing AI Tools	Proposed System
Response Time	4–6 sec	3–5 sec
Customization Level	Medium	High
Backend Integration	Limited	Full-stack
Data Persistence	Partial	Full Database Support



**Figure 2** Performance Comparison of System Modules



**Figure 3** Response Time of System Modules with Slide



**Figure 4** AI Module Performance Metrics

**Table 2** Comparison with Existing AI PPT Builders Systems

Feature	Traditional PPT	Existing AI Tools	Proposed System
Manual Editing	Yes	Yes	Yes
AI Slide Generation	No	Yes	Yes
Structured JSON Output	No	Limited	Yes
Real-time Editing	Yes	Limited	Yes
Subscription Integration	No	Partial	Yes
Customization	Medium	Medium	High
Drag-and-Drop Builder	Basic	Limited	Advanced

The suggested solution also enhanced response time of slide generation as well as the execution of user promote and memory usage.

### 5.9. Comparison to the Existing AI PPT Systems

The suggested AI-Powered Presentation Builder Platform is much more automotive and scalable in comparison to the traditional PowerPoint tools and existing AI-based presentation systems regarding automation and structure. Conventional PPT software is manual, has no AI generated slides, no structured JSON export, and no subscription, has simple drag-and-drop capabilities and medium level customization. Existing AI tools provide slide generation capabilities but often deliver limited structured output, partial subscription models, restricted real-time editing, and basic or limited drag-and-drop builders. The proposed system, in its turn, is a combination of intelligent AI slide generation and fully structured JSON output to be processed in a modular way, real-time editing, full subscription integration, high-level customization with an advanced drag-and-drop builder, which makes it a more scalable, efficient, and fully automated presentation management solution that is based on the SaaS.

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## 6. Conclusion

This paper presented an AI-based SaaS Presentation Builder that automates slide creation using OpenAI's NLP models and a modern web stack with Next.js, Prisma, and Neon for scalable, reliable database management. Secure authentication and subscription handling are provided via Clerk and LemonSqueezy. The system demonstrates improved efficiency, reduced manual effort, reliable multi-user management, and cloud-native scalability. Its modular, microservice-based architecture enables fault tolerance, easy integration of new AI features, and enhanced usability. By combining AI-driven content generation with dynamic UI rendering, the platform offers a practical solution for academic, professional, and productivity applications.

The proposed system highlights the potential of integrating intelligent automation with scalable web technologies to transform traditional presentation workflows. By ensuring consistent quality, enabling rapid content generation, and supporting both educational and corporate users, it lays a foundation for extensible, reliable, and adaptable productivity tools. Future directions include multi-modal content, real-time collaboration, adaptive templates, multilingual support, and performance optimization.

### *Future scope*

Future enhancements may include real-time collaborative editing, multi-modal content generation (text, images, audio, video), adaptive template recommendations, multilingual support, and performance optimization through distributed caching and edge deployment. Integration with AI-driven analytics to suggest improvements and automated presentation feedback systems can further enhance user experience. These improvements can make the platform more intelligent, interactive, and versatile for academic, professional, and enterprise applications.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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