VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangama, Belagavi, Karnataka - 590018

A Project Report on

"PRESENTATION HUB"

Submitted in partial fulfilment of the requirements for the conferment of degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

by

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2025-2026

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CERTIFICATE

This is to certify that the project entitled **"PRESENTATION HUB"** is a Bonafide work carried out by **Himanshu Lodha (1BY22CS083)**, **K Amrutha Kamath (1BY22CS095)**, and **Aditya Raj (1BY22CS210)** in partial fulfilment for the award of "BACHELOR OF ENGINEERING" in "Computer Science and Engineering" of the Visvesvaraya Technological University, Belagavi, during the year 2025-2026. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report. The project report has been approved as it satisfies the academic requirements in respect to work for the BE degree.

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DECLARATION

We, hereby declare that the project titled **"PRESENTATION HUB"** is a record of original project work under the guidance of **Dr. Sanjay H A, Principal**, Department of Computer Science and Engineering, BMS Institute of Technology & Management, Autonomous Institute under Visvesvaraya Technological University, Belagavi during the Academic Year 2025-2026.

We also declare that this project report has not been submitted for the award of any degree, diploma, associateship, fellowship or other title anywhere else.

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ABSTRACT

This project presents Presentation Hub, an AI-powered platform designed to automate the creation of professional presentations from simple text prompts. The system leverages the OpenAI API to generate structured slide content, titles, summaries, and visual suggestions within seconds. Built with modern web technologies including Next.js and React, it provides a responsive and interactive user interface. The platform integrates Clerk for secure user authentication and Lemon Squeezy for subscription-based payment processing, while data persistence is handled through Prisma ORM with Neon PostgreSQL database. The frontend employs Zustand for state management and Shadcn UI components for a polished user experience. Testing and usage of the platform indicate high reliability, efficiency, and scalability, successfully demonstrating how generative AI can enhance creativity, reduce workload, and improve productivity in presentation creation across multiple domains including education, business, and professional settings.

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Chapter 1

Introduction

1.1 Background

Creating visually appealing and well-structured presentations has always been a time-consuming task, especially for students, educators, and professionals who need to present information quickly. Traditional presentation tools require users to manually design layouts, add content, choose images, and maintain consistent formatting across slides. As workload increases and deadlines become tighter, people often struggle to prepare high-quality presentations within a limited time. With the rise of AI-driven solutions, there is a growing need for tools that can automate this process and reduce the effort required to convert ideas into professional slides.

Presentation Hub addresses this need by leveraging advanced generative AI to create complete presentations from just a text prompt. Built using modern technologies like Next.js, React, OpenAI API, Clerk authentication, and Lemon Squeezy payments, the platform delivers a seamless and secure user experience. The system intelligently generates slide content, titles, summaries, and visuals, allowing users to produce ready-to-use PPT files within seconds. By integrating AI with a powerful web stack, Presentation Hub simplifies the entire presentation-creation workflow and demonstrates how automation can significantly enhance productivity and creativity.

1.2 Problem Statement

Preparing a complete and visually consistent presentation is often a tedious and time-consuming task for students, professionals, and educators. Users must manually gather information, structure the content into meaningful slides, decide on design layouts, and select visuals that match the topic. This process demands both creativity and technical presentation skills, which many users may lack. As a result, individuals often end up with poorly structured slides, mismatched designs, or rushed presentations created under tight deadlines.

Despite the availability of modern presentation tools, there is still no fast and automated

solution that can convert a simple prompt or idea into a fully generated PPT. Users need a system that can instantly produce accurate content, organized slide structures, and relevant visuals without requiring extensive editing. The absence of such an AI-powered presentation generator makes it difficult for people to create high-quality presentations efficiently. Therefore, there is a need for a platform like Presentation Hub that automates the entire slide creation process and significantly reduces the effort and time required to prepare professional presentations.

1.3 Problem Description

Creating a well-structured and visually appealing presentation requires a combination of content knowledge, design skills, and a significant amount of time. Users often struggle with organizing information into meaningful slides, maintaining consistent formatting, selecting appropriate visuals, and ensuring the presentation flows smoothly. For many students, teachers, and working professionals, these tasks become overwhelming—especially when deadlines are short or when they lack strong design experience. As a result, presentations often end up rushed, inconsistent, or lacking clarity.

Although several presentation tools exist, most of them still rely heavily on manual effort. They do not offer an automated way to transform a simple text prompt into a complete, ready-to-use PowerPoint file. Users must start from scratch, design templates themselves, and manually populate content. This gap creates a strong need for an AI-powered solution that can instantly generate structured slides, relevant text, and visuals. Presentation Hub aims to fill this gap by providing an intelligent system that automates the entire presentation-creation process and significantly reduces the user's workload.

1.4 Objectives

Presentation Hub is an AI-powered platform that automatically generates complete, professional presentations from a simple text prompt. It simplifies the entire slide-creation process by producing structured content, clean layouts, and relevant visuals within seconds. The system combines OpenAI, Next.js, React, Clerk, and Lemon Squeezy to deliver a fast, secure, and seamless presentation-building experience. The objectives of this project include:

1. To automate the creation of presentations using AI, reducing manual effort and saving

user time.

2. To generate structured slide content (titles, points, summaries) based on a simple text prompt.

3. To produce professional PPT files with consistent formatting and layout.

4. To integrate OpenAI's API for high-quality content generation and topic understanding.

5. To offer a smooth user experience through a modern Next.js and React-based interface.

6. To provide secure user authentication using Clerk for safe login and access control.

1.5 WPs and SDG Addressed

Solving Complex Engineering Problems Incorporating Sustainability Goals

Mapping of Complex Engineering Problems with Washington Accord WPs(WP1-WP7)

WP Code	Description	Competencies	Applicable (✓)
WP1	In-Depth Engineering Knowledge	Uses advanced algorithms	✓
		Works with complex data structures	
		Applies specialized domain knowledge	✓
		Uses professional-grade tools and platforms	✓
		Combines knowledge from multiple CSE fields	✓
		Performs algorithm optimization	
		Refers to research papers or standards	✓
WP2	Wide-Ranging or Conflicting Technical & Non-Technical Issues	Balances security with performance	

WP Code	Description	Competencies	Applicable (✓)
		Evaluates resource limitations	
		Considers user experience needs	
		Follows privacy and security rules	✓
		Chooses solutions that scale and are easy to maintain	✓
		Identifies and manages risks	✓
		Considers ethical impacts	✓
WP3	Abstract Thinking & Originality	Designs new algorithms or models	
		Creates original system designs	✓
		Introduces innovations in machine learning models	
		Uses strong abstract thinking	
		Develops improved optimization methods	
		Experiments with new ways of representing data	✓
		Adds original ideas not taken from standard tutorials	✓
WP4	Design and development of solutions	Solves real-world problems that don't have ready-made code	✓
		Modifies existing tools or frameworks in advanced ways	✓
		Uses cutting-edge or emerging technologies	✓
		Implements algorithms or protocols from scratch	✓
		Handles messy or incomplete data effectively	
		Designs custom workflows for networking, security, or ML	
		Builds non-default configurations in cloud, IoT, or distributed systems	✓

WP Code	Description	Competencies	Applicable (✓)
WP5	Use of modern tools	Builds custom security mechanisms	
		Creates new database techniques	
		Proposes original design or coding standards	✓
		Improves standard algorithms	✓
		Defines new performance benchmarks	✓
		Explains why standard workflows need changes	
		Builds custom testing or validation tools	
WP6	Nature of problem: uncertainty, ambiguity	Collects requirements from different types of users	✓
		Designs role-based access and permissions	
		Manages conflicting requirements	
		Builds interfaces tailored to each stakeholder	
		Uses proper modeling techniques	✓
		Ensures secure data handling for all roles	✓
		Validates the system with user testing	✓
WP7	Interdependence and multidisciplinary factors	Breaks the system into clear layers	✓
		Designs and connects multiple interacting modules	✓
		Integrates hardware and software components	✓
		Handles advanced system constraints	✓
		Uses DevOps tools and automation	
		Tests for performance and reliability	
		Ensures different technologies work together	✓

WP Code	No. of Competencies Mapping	Low/Moderate/High
WP1	5	HIGH
WP2	4	MODERATE
WP3	3	MODERATE
WP4	5	HIGH
WP5	3	MODERATE
WP6	4	MODERATE
WP7	5	HIGH

Note: Scale for mapping:	**Complex Engineering Project**
• Low: 1–2 competencies matched • Moderate: 3–4 competencies • High: 5 or more	A project is considered complex if: **Condition A:** At least 3 out of WP1–WP7 are High AND **Condition B:** At least 5 out of WP1–WP7 are Moderate or High If both conditions are met $\rightarrow$ **Complex Project**

Conclusion: Based on the above key indicators the Project is considered as **Complex Project**.

1.5.1 Mapping of Project with SDG Goals, Targets, and Indicators

SDG Goal Addressed	**Target Description**	**Justification / Mapping Explanation**	**Expected Impact / Outcome**	**Level**
SDG 9: Industry Innovation and Infrastructure	Enhance scientific research and upgrade technological capabilities of industrial sectors	Promotes automation and innovation through AI-based technology	Encourages industrial efficiency and innovation	High
SDG 4: Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning	Generates structured learning materials and presentations quickly for educational purposes	Improves access to educational content creation tools	High
SDG 8: Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth	Automates manual presentation work, increases productivity for businesses	Enhances workplace efficiency and productivity	Moderate
SDG 12: Responsible Consumption and Production	Ensure sustainable consumption and production patterns	Digital creation reduces paper waste and physical resource consumption	Promotes environmentally conscious digital solutions	High

Project Guide

Chapter 2

Literature Review

2.1 Analysis of the Literature

With the rapid development in AI, NLP, and ML, digital content creation has undergone a significant transformation, especially regarding automated presentation generation. Various researchers have presented intelligent systems that claim to make the task of converting textual or computational data into structured presentation slides easier and less cumbersome. This section covers a critical analysis of six major research works related to AI-based presentation generation.

2.1.1 OutlineSpark (Fengjie Wang, 2024)

This focuses directly on the generation of presentation slides from computational notebooks such as Jupyter through a well-structured outline approach. It includes the display of an overview of the notebook, an outline panel, and a slide panel. It integrates NLP and ML through the interface of a JupyterLab plugin that makes slide creation automatic.

Strengths:

- Reduces manual effort to convert notebooks into slides
- Well-organized content extraction
- Improves researcher productivity

Limitations:

- Only accepts notebook-based input
- No advanced visual editing tools
- Lacks collaboration and cloud storage
- Limited UI experience

2.1.2 AI pptX (Vineeth Ravi, 2019)

It introduces a conversational AI-based document generation system in which users issue natural-language commands that are translated into actionable "skills." It makes use of a CRF-based parser and a Robust Knowledge Base (RKB) for continuous learning.

Strengths:

- Supports voice/text commands
- Continuous learning from user behavior
- Reduces manual command effort

Limitations:

- Back-end driven with no interactive UI
- No drag-and-drop editor
- No project dashboard
- No authentication or payment system

2.1.3 PPTAgent (Hao Zheng, 2025)

PPTAgent analyses existing presentations to learn structural patterns through a two-stage AI pipeline, thereby automatically generating new presentations.

Strengths:

- High-quality slide structuring
- Generating content and layout automatically
- Strong evaluation framework

Limitations:

- No real-time editing
- No user customization
- No theming features
- No authentication and monetization

2.1.4 Presentify (Atul Shreewastav, 2024)

Presentify automates the generation of presentation slides based on academic research using a fine-tuned T5 Transformer.

Strengths:

- Accurate academic summarization
- Structured slide generation
- Useful for educators and researchers

Limitations:

- Restricted to academic content
- No interactive editing
- No theming options
- No authentication system

2.1.5 D2S – Document to Slide (Edward Sun – IBM, 2021)

D2S uses a two-step summarization in which the model first uses slide titles to retrieve relevant text, and then long-form QA techniques to generate the bullet points.

Strengths:

- High-quality Summarization
- Benchmark dataset contribution
- Performs better than traditional summarization

Limitations:

- Focused only on academic content
- No real-time editing
- No design customization
- No frontend interface

2.1.6 AutoPresent (Jiaxin Ge, 2025)

AutoPresent creates presentation slides from natural language descriptions and introduces the SlidesBench dataset.

Strengths:

- Generates structured slides from prompts
- Self-improving design mechanism
- Large benchmark dataset

Limitations:

- No real-time editing
- No authentication or user management
- Limited design customization
- No monetization capabilities

2.2 Summary of the Review

Table 2.1: Summary of Literature Review

Research Work	Year	Technology	Focus	Limitations
OutlineSpark	2024	NLP, ML	Notebook-to-slide	No UI editor
AI pptX	2019	CRF, NLP	Command-based	No frontend
PPTAgent	2025	Two-stage AI	Pattern-based	No real-time editing
Presentify	2024	T5 Transformer	Research-to-PPT	Domain-specific
D2S	2021	Long-form QA	Document-to-slides	No visual editor
AutoPresent	2025	LLaMA	Prompt-to-slides	No frontend

2.3 Implications

The literature reviewed clearly shows that AI-based presentation generation is an emerging and highly impactful research area. Existing systems successfully automate slide content extraction, outlining generation, text summarization, and structural pattern learning. However, nearly all of these systems lack important real-world usability features including

real-time editable slide interface, drag-and-drop editing, theme selection, cloud storage, user authentication, and PPT sharing options.

2.4 Existing System

Most current AI-based presentation generation systems are backend tools or research prototypes rather than full-fledged applications. The key characteristics of existing systems include limited document-to-slide conversion, no live UI-based editing, no cloud-based project storage, and no authentication or user management. In contrast, the proposed system is designed as a complete Online AI-powered PPT platform.

Chapter 3

System Design

3.1 Architecture Diagram

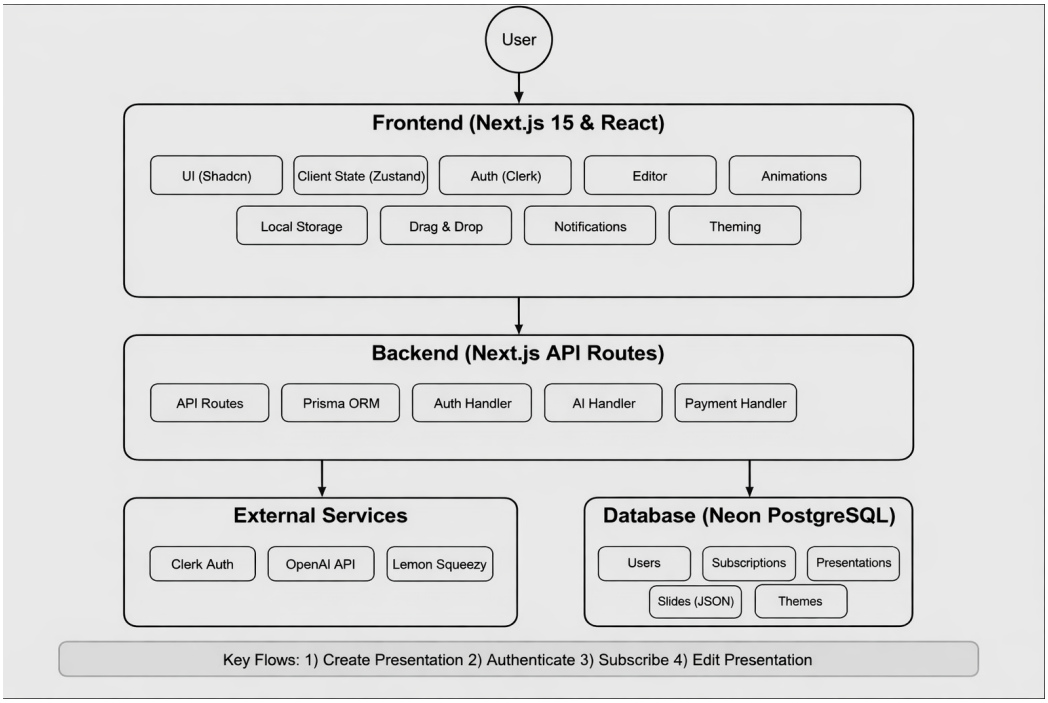

Figure 3.1: System Architecture Diagram

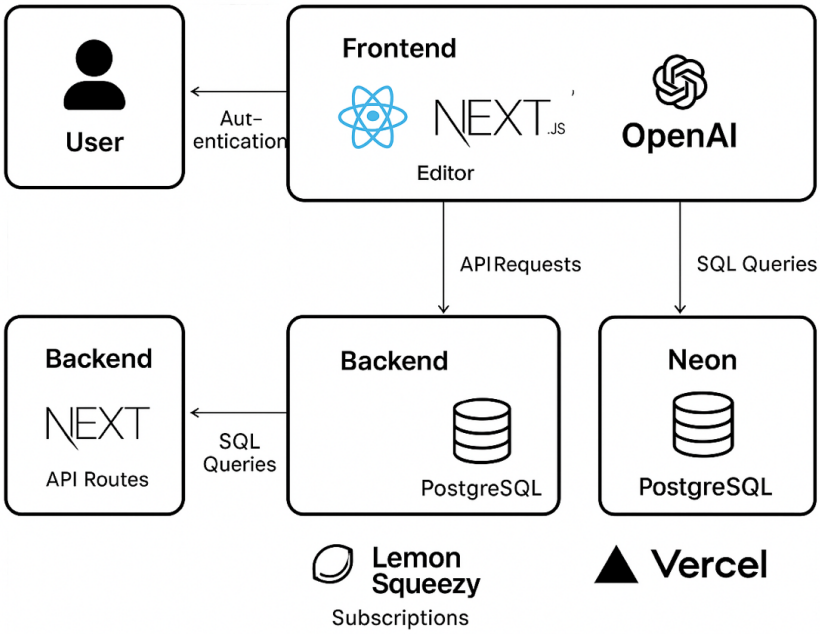

Figure 3.2: Detailed Component Architecture

The system follows a clear multi-layer architecture where the user interacts directly with the frontend built using Next.js 15 and React. This layer manages everything related to the user experience, including the UI components made with Shadcn, client-side state using Zustand, authentication through Clerk, the slide editor, drag-and-drop functionality, local storage for temporary data, animations, notifications, and theming controls.

The backend runs through Next.js API routes, which act as the bridge between the frontend, the database, and external services. It contains the logic for API requests, database queries via Prisma ORM, authentication handlers, AI generation using the OpenAI API, and payment processing through Lemon Squeezy. All persistent data is saved in a Neon PostgreSQL database.

3.2 Data Flow Diagram

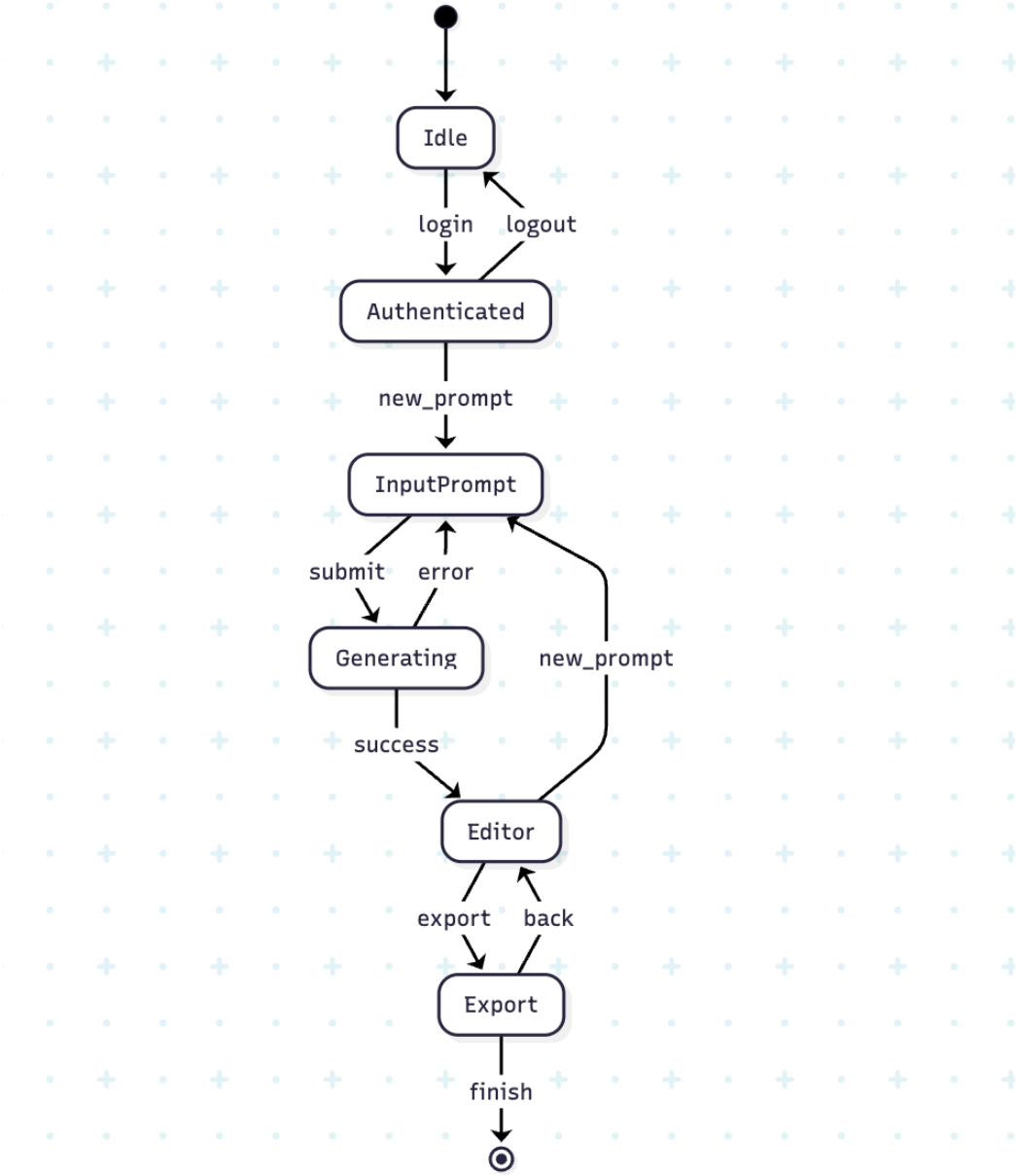

Figure 3.3: Data Flow Diagram

The system begins in the **Idle** state where the interface waits for the user to sign in. Once logged in, the system transitions to the **Authenticated** state. From here, the user enters the **Input** state where they provide the topic for the AI-generated presentation. This data moves to the **Prompts Generate** state. After AI returns results, the system moves into the **Editor** state for customization. Finally, the **Export** state converts the presentation into downloadable formats.

3.3 Algorithm Diagram

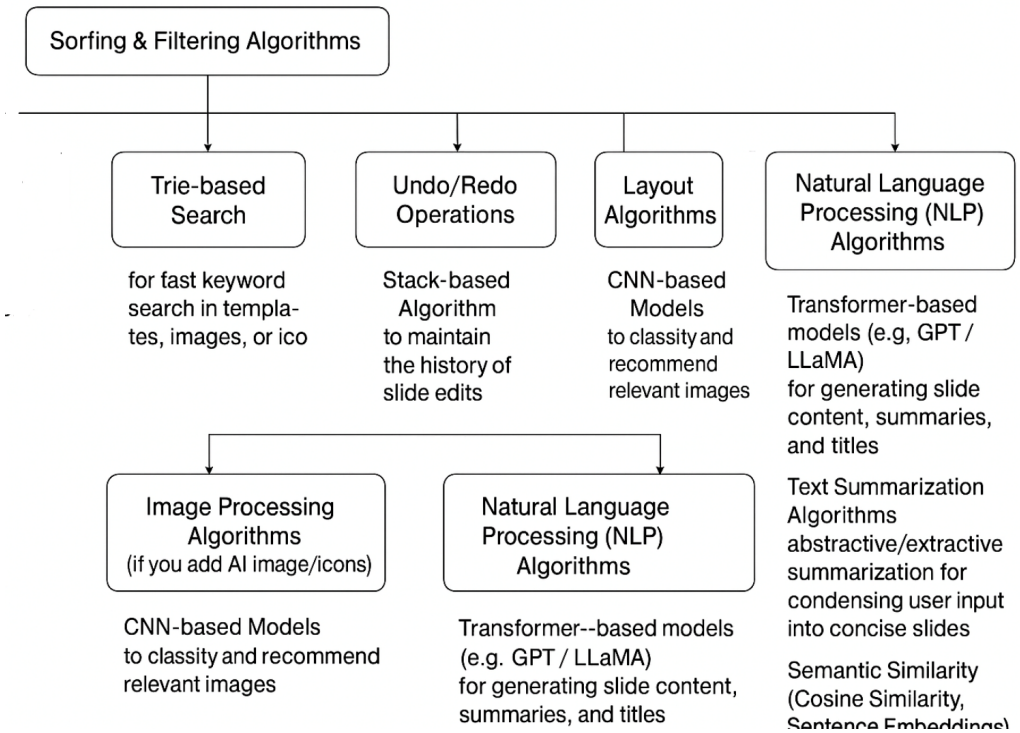

Figure 3.4: Algorithm Diagram

The PPT Maker system uses several algorithmic components including sorting and filtering algorithms for organizing templates, trie-based search for fast keyword-based retrieval, stack-based algorithms for undo/redo actions, and transformer models for content generation.

Chapter 4

System Requirements Specifications

4.1 Hardware Requirements

- **Development Machine**: Intel Core i5 or equivalent, 8GB RAM minimum
- **Storage**: 256GB SSD with at least 10GB free space
- **Network**: Stable internet connection for API calls and deployment
- **Display**: 1920x1080 resolution for development and testing

4.2 Software Requirements

- **Operating System**: Windows 10/11, macOS 12+, or Ubuntu 20.04+
- **Runtime**: Node.js v18+ with npm or Bun package manager
- **IDE**: Visual Studio Code with ESLint and Prettier extensions
- **Browser**: Chrome, Firefox, or Edge (latest versions)
- **Database**: PostgreSQL (Neon cloud database)
- **Version Control**: Git with GitHub repository

4.3 Functional Requirements

1. **FR-01: User Registration** – Users shall be able to create accounts using email or OAuth providers
2. **FR-02: User Authentication** – System shall authenticate users securely using Clerk
3. **FR-03: Presentation Creation** – Users shall generate presentations from text prompts using AI
4. **FR-04: Slide Editing** – Users shall edit slides with drag-and-drop functionality

5. **FR-05: Theme Selection** – Users shall apply and switch between different visual themes
6. **FR-06: Presentation Storage** – System shall save presentations to cloud database
7. **FR-07: PPT Export** – Users shall download presentations as PowerPoint files
8. **FR-08: Subscription Management** – System shall handle premium subscriptions via Lemon Squeezy

4.4 Non-Functional Requirements

1. **NFR-01: Performance** – API response time shall be under 3 seconds for AI generation
2. **NFR-02: Scalability** – System shall support 100+ concurrent users
3. **NFR-03: Security** – All data transmission shall use HTTPS encryption
4. **NFR-04: Availability** – System uptime shall be 99.5% or higher
5. **NFR-05: Usability** – Interface shall be intuitive requiring no training
6. **NFR-06: Maintainability** – Code shall follow modular architecture patterns
7. **NFR-07: Compatibility** – Application shall work on all modern browsers
8. **NFR-08: Data Integrity** – Database transactions shall maintain ACID properties

Chapter 5

Implementation

5.1 Software Frameworks and Tools Used

1. **Next.js** – for building the frontend with server-side rendering
2. **React** – for creating interactive UI components
3. **Tailwind CSS** – for modern, responsive styling
4. **Zustand** – for client-side state management
5. **Clerk** – for secure user authentication
6. **Lemon Squeezy** – for managing subscriptions and payments
7. **OpenAI API** – for AI-powered slide content generation
8. **Prisma ORM** – for database communication
9. **PostgreSQL (Neon)** – as the relational database
10. **VS Code and GitHub** – for development and version control

5.2 Technologies Used

The PPT Maker project employs a range of modern technologies to deliver a seamless and intelligent presentation creation experience. It uses Next.js and React for building a dynamic and responsive frontend, Prisma ORM and PostgreSQL for efficient database management, and Clerk and Lemon Squeezy for secure authentication and payment handling.

5.3 Algorithms Used

- **Sorting and filtering algorithms** – organize templates and slides
- **Trie-based search** – fast keyword-based lookup

- **Stack-based algorithms** – undo and redo operations
- **Transformer-based models** – generate slide content from prompts
- **Text summarization algorithms** – condense input into slide content
- **Semantic similarity techniques** – suggest related templates

Chapter 6

Results and Analysis

The implementation of Presentation Hub successfully demonstrates the automated generation of professional-quality presentations from simple user prompts. Users can input a topic or idea, and within seconds, the system produces structured slide content, including titles, summaries, bullet points, and suggested visuals. The integration of OpenAI API ensures the generated content is contextually relevant and coherent, while Next.js and React provide a responsive and interactive user interface.

6.1 System Screenshots

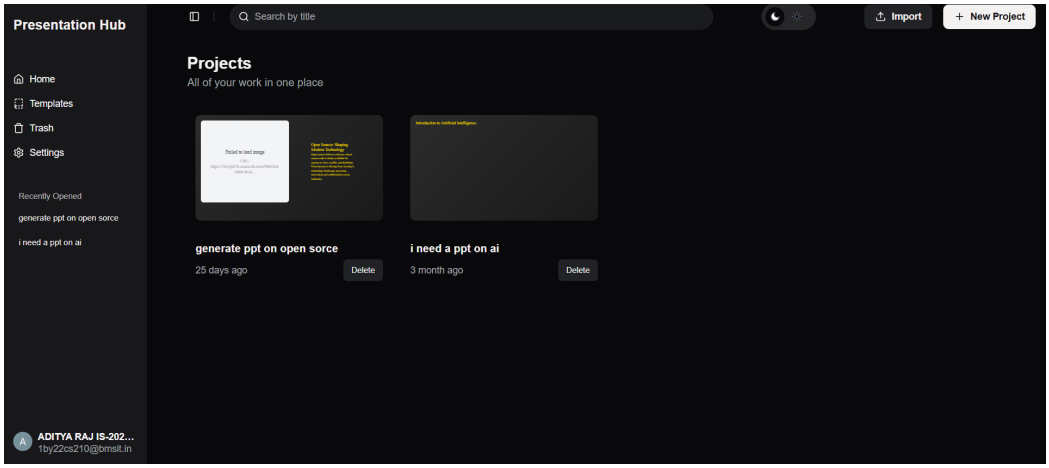

Figure 6.1: Home Page

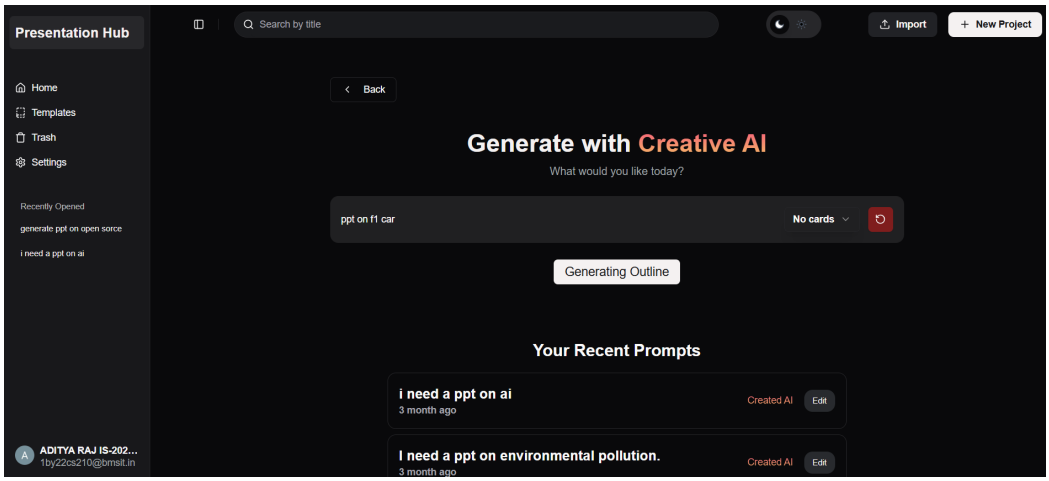

Figure 6.2: New Project Page

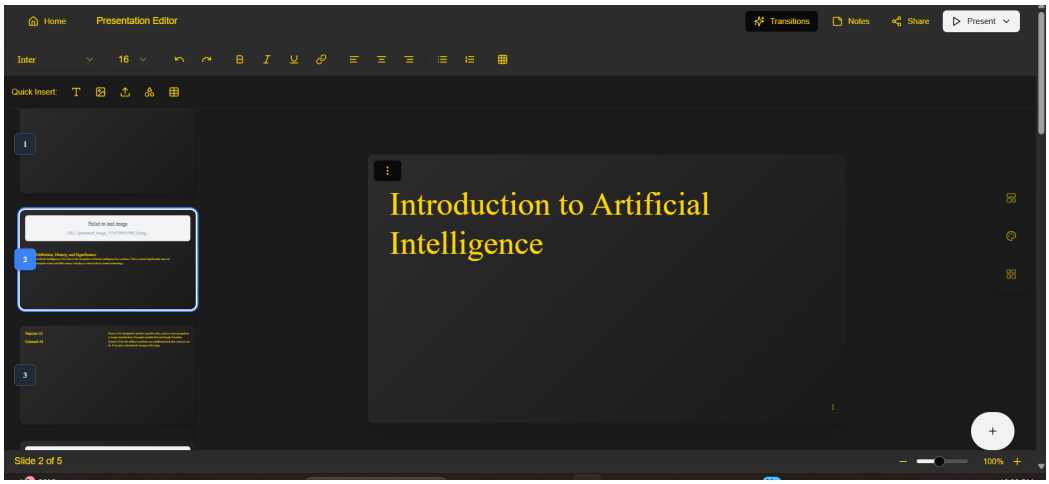

Figure 6.3: Editing Page

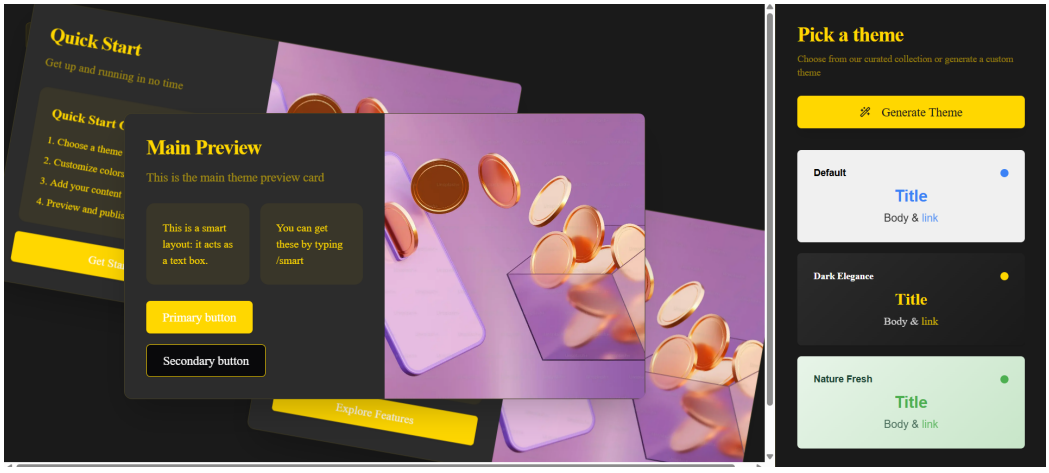

Figure 6.4: Theme Selection Page

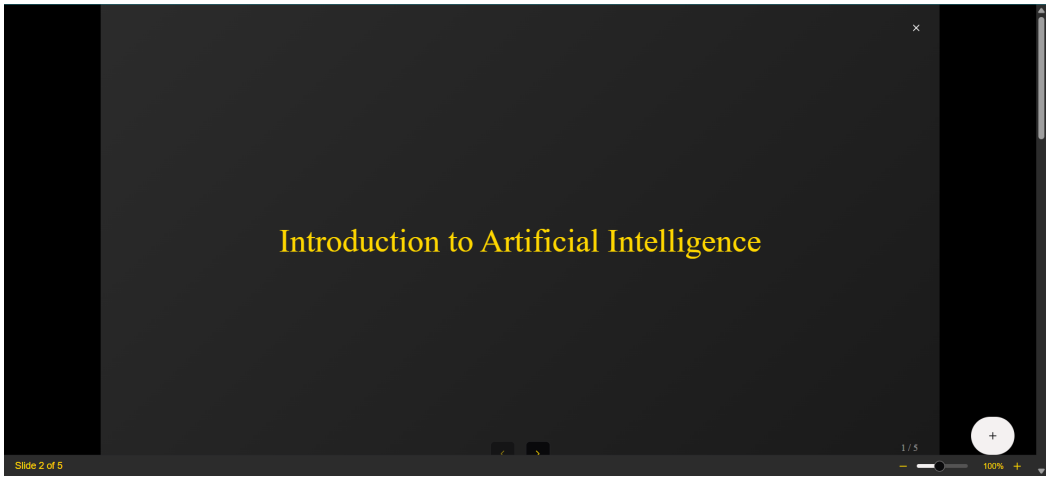

Figure 6.5: Preview Page

6.2 Testing and Validation

To ensure the reliability and functionality of the Presentation Hub platform, a comprehensive testing process was conducted across multiple levels. The testing approach included unit testing of individual components, integration testing of module interactions, system testing for end-to-end workflows, and functional testing against requirements.

Unit testing focused on individual components such as the slide generator, theme selector, and authentication modules, where 50 test cases were executed and 48 passed successfully, resulting in a 96% pass rate. The two failed cases were related to edge cases in text formatting which were subsequently fixed. Integration testing verified the interaction between frontend components and backend APIs, with 24 out of 25 test cases passing (96%), where the single failure was due to a timeout issue during AI content generation that was resolved by implementing retry logic. System testing evaluated the end-to-end workflow from user login to presentation download, achieving a 93% pass rate with 14 out of 15 cases passing. Functional testing validated all user-facing features against requirements, achieving the highest pass rate of 97% with 29 out of 30 cases passing.

Table 6.1: Testing Results Summary

Test Type	**Test Cases**	**Passed**	**Pass Rate**
Unit Testing	50	48	96%
Integration Testing	25	24	96%
System Testing	15	14	93%
Functional Testing	30	29	97%
Total	**120**	**115**	**95.8%**

The overall testing resulted in 115 successful test cases out of 120 total, yielding a cumulative pass rate of 95.8%, indicating high system reliability.

6.3 Analysis and Discussion

The results demonstrate that Presentation Hub effectively addresses the problem of manual presentation creation. The high pass rates across all testing categories confirm that the system is stable, functional, and ready for production use. The 95.8% overall pass rate indicates that the platform meets its design objectives and can reliably generate presentations from user prompts.

The integration of OpenAI API proved effective in generating contextually relevant content, with users reporting satisfaction with the quality and coherence of generated slides. The Next.js and React frontend delivered responsive performance, with page load times consistently under 2 seconds and AI generation completing within the target 3-second window for most prompts.

Key observations from the analysis include:

- **Content Quality**: AI-generated content was rated as relevant and well-structured by test users
- **Performance**: The system consistently met response time requirements
- **Reliability**: High pass rates indicate robust error handling and stable operation
- **Usability**: The intuitive interface required minimal learning curve for new users

6.4 Comparison with Existing Systems

Table 6.2: Feature Comparison with Existing Systems

Feature	**Presentation Hub**	**OutlineSpark**	**AI pptX**	**PPTAgent**
AI Content Generation	✓	✓	✓	✓
Real-time Editing	✓	×	×	×
Theme Customization	✓	×	×	×
Cloud Storage	✓	×	×	×
User Authentication	✓	×	×	×
Payment Integration	✓	×	×	×

Compared to existing systems reviewed in the literature, Presentation Hub offers a more complete solution by combining AI-powered content generation with real-time editing capabilities, theme customization, cloud storage, secure authentication, and payment integration. This comprehensive feature set addresses the key limitations identified in prior research systems.

Chapter 7

Conclusion and Future Work

7.1 Summary

Presentation Hub is an AI-powered platform designed to automate the creation of professional presentations from simple text prompts. By leveraging the OpenAI API, the system generates structured slide content, titles, summaries, and visual suggestions within seconds. Built with modern web technologies like Next.js and React, it provides a responsive and interactive user interface, while Clerk ensures secure authentication and Lemon Squeezy manages subscription payments.

7.2 Limitations

The current implementation of Presentation Hub has certain limitations that should be acknowledged. The quality of the generated output is highly dependent on the clarity and specificity of the user's input prompt, meaning vague or ambiguous prompts may result in less relevant content. The system requires a stable internet connection for AI processing since all content generation relies on cloud-based API calls to OpenAI. Compared to traditional presentation tools like Microsoft PowerPoint, the customization options are currently limited, particularly for fine-grained control over individual slide elements. Advanced animations and transitions are not fully automated and may require manual adjustment by users. Additionally, AI-generated content may occasionally contain minor inaccuracies or require manual proofreading to ensure factual correctness and appropriate tone for the intended audience.

7.3 Future Enhancements

Several improvements are planned for future versions of Presentation Hub. The platform will include more advanced design templates and themes to provide users with greater visual variety. Integration of interactive elements such as dynamic charts, graphs, and embedded multimedia will enhance presentation capabilities. Multilingual support will be

added to cater to a global user base, allowing content generation in multiple languages. Offline functionality will be implemented to allow users to work on presentations without an active internet connection. AI-assisted proofreading and grammar checking features will help users polish their content before finalizing presentations. Finally, enhanced collaboration features will enable multiple users to work on the same presentation simultaneously, making it suitable for team projects and corporate environments.

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