

Smart Study Planner

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ABSTRACT

Modern students often struggle with managing their study time effectively due to multiple academic tasks, assignments, exams, and personal activities. Traditional planning methods, such as manual timetables or basic calendar applications, do not provide intelligent assistance for optimising study schedules. This paper proposes a Smart Study Planner, an AI-based web platform designed to help students organise and optimise their study activities efficiently. The system collects user inputs such as subjects, assignment deadlines, exam schedules, study preferences, and available time to automatically generate personalised daily and weekly study schedules. The platform also integrates features such as study reminders, progress tracking, and a Pomodoro-based study timer to improve productivity and focus. By combining artificial intelligence techniques, scheduling algorithms, and modern web technologies, the proposed system provides students with an intelligent and adaptive learning support tool. The Smart Study Planner demonstrates how AI-driven automation can improve time management, enhance study efficiency, and support better academic performance.

Keywords: Artificial Intelligence, Smart Study Planner, Study Schedule Optimisation, Personalised Learning, Time Management System, Pomodoro Timer, Web-Based Study Planner, Academic Productivity, Study Reminder System, Educational Technology.

1 INTRODUCTION

The rapid growth of digital education and academic competition has increased the need for intelligent systems that can assist students in managing their study schedules effectively. Many students struggle to balance multiple academic activities such as classes, assignments, exams, and personal tasks. Traditional study planning methods, such as handwritten timetables or simple calendar tools, are mostly static and do not utilise the potential of artificial intelligence and smart scheduling techniques [1].

At the same time, students require personalised study plans that match their learning pace, preferred study hours, and subject priorities. Manually organising study schedules can be time-consuming and often results in inefficient time management. An intelligent system that can automatically analyse academic workload, deadlines, and available time can significantly improve study productivity and learning outcomes [2].

This project addresses these challenges by developing a Smart Study Planner, an AI-enabled web-based platform that helps students organise and optimise their study activities. The system processes user inputs such as subjects, deadlines, preferred study time, and daily routines to generate personalised study schedules. It also integrates features such as study reminders, progress tracking, and a Pomodoro-based study timer to enhance focus and productivity. The proposed system demonstrates how Artificial Intelligence, scheduling algorithms, and modern web technologies can be combined to create a smart, scalable, and interactive learning support platform.

2 LITERATURE REVIEW

Several research studies have explored the use of Artificial Intelligence, scheduling algorithms, and educational technologies to improve study planning and time management for students.

Johnson et al. [1] proposed an intelligent study scheduling system that uses rule-based algorithms to generate study timetables based on subject priorities and deadlines. The system improved time management for students; however, it lacked adaptive features that could adjust schedules based on user preferences and productivity patterns.

Kumar and Singh [2] developed a web-based academic planner that allowed students to manage assignments, exam schedules, and study activities in one platform. The system provided a structured planning interface but did

not include AI-based automation for generating personalised study schedules.

Li et al. [3] presented a machine learning-based recommendation system designed to suggest learning resources and study plans according to student performance data. Although the approach enhanced personalised learning, it did not incorporate real-time scheduling or integrated productivity tools such as study timers and reminders.

Patel and Shah [4] explored the use of productivity techniques such as the Pomodoro method in digital study tools to improve focus and reduce procrastination among students. The study showed improved concentration levels, but did not integrate these techniques into a complete intelligent study planning platform.

Brown and Davis [5] proposed an AI-driven educational assistant capable of analysing student workload and recommending study schedules. While the system demonstrated promising results in improving study efficiency, it lacked a fully implemented web-based platform and a user-friendly interface for practical use.

These studies highlight the importance of intelligent study planning systems; however, many existing solutions lack integration between AI-based scheduling, productivity tools, and user-friendly web platforms. The proposed Smart Study Planner aims to address these limitations by combining AI-driven schedule generation, study progress tracking, reminders, and a Pomodoro-based focus timer within a single web-based platform designed to enhance students' academic productivity.

2.1 System Overview

The proposed system is an AI-enabled Smart Study Planner platform designed to help students manage their academic schedules efficiently. The platform integrates Artificial Intelligence, scheduling algorithms, productivity tools, and modern web technologies into a unified web-based solution.

The system collects user inputs such as subjects, assignment deadlines, exam schedules, and preferred study hours to generate personalised study schedules automatically. It also provides features such as study reminders, progress tracking, and a Pomodoro-based study timer to improve focus and time management. The platform helps students organise their study activities and enhance their overall academic productivity.

2.2 Objectives of the Proposed System

The primary objectives of the **Smart Study Planner** system are:

- To develop an AI-based study planning system that automatically generates personalised study schedules.
- To help students manage subjects, assignments, and exam schedules efficiently.
- To improve time management and productivity through intelligent scheduling.
- To provide study reminders and notifications for upcoming tasks and deadlines.
- To track student study progress and completed study sessions.
- To enhance focus using productivity techniques such as a Pomodoro study timer.
- To develop a user-friendly and scalable web-based study planning platform.

2.3 Functional Modules

The proposed Smart Study Planner system consists of the following core modules:

- **User Interface Module:**
Provides a responsive and user-friendly web interface where students can register, log in, add study subjects, assignments, and exam schedules, and view their personalised study plans.
- **AI-Based Study Schedule Generation Module:**
Analyses user inputs such as subjects, deadlines, study hours, and preferences to automatically generate optimised daily and weekly study schedules.
- **Study Management Module:**
Allows users to add, update, and delete study subjects, assignments, and exam schedules to effectively organise their academic tasks.
- **Task Validation Module:**
Ensures the correctness and reliability of user input by validating task details such as task name, deadline, and priority. It prevents invalid or duplicate entries and ensures that deadlines follow proper formats and constraints.
- **Study Progress Tracking Module:**
Tracks completed study sessions and displays study progress to help students monitor their learning performance.
- **Reminder and Notification Module:**

Provides reminders and notifications for scheduled study sessions, assignment deadlines, and upcoming exams.

- **Productivity Tools Module:**
Includes a Pomodoro-based study timer to help students maintain focus and improve study efficiency.
- **Security and Authentication Module:**
Implements secure user authentication, including login, password protection, and secure access to user data.

2.4 System Workflow

- Users register and log in to the Smart Study Planner securely.
- Students enter their study details, such as subjects, assignments, exam schedules, and preferred study hours.
- The AI-based scheduling system analyses the input data and generates personalised daily and weekly study plans.
- Students manage their study tasks by adding, editing, or deleting subjects and deadlines.
- The system sends reminders and notifications for scheduled study sessions and upcoming deadlines.
- Study progress is tracked, and productivity tools such as the Pomodoro timer help students stay focused during study sessions.

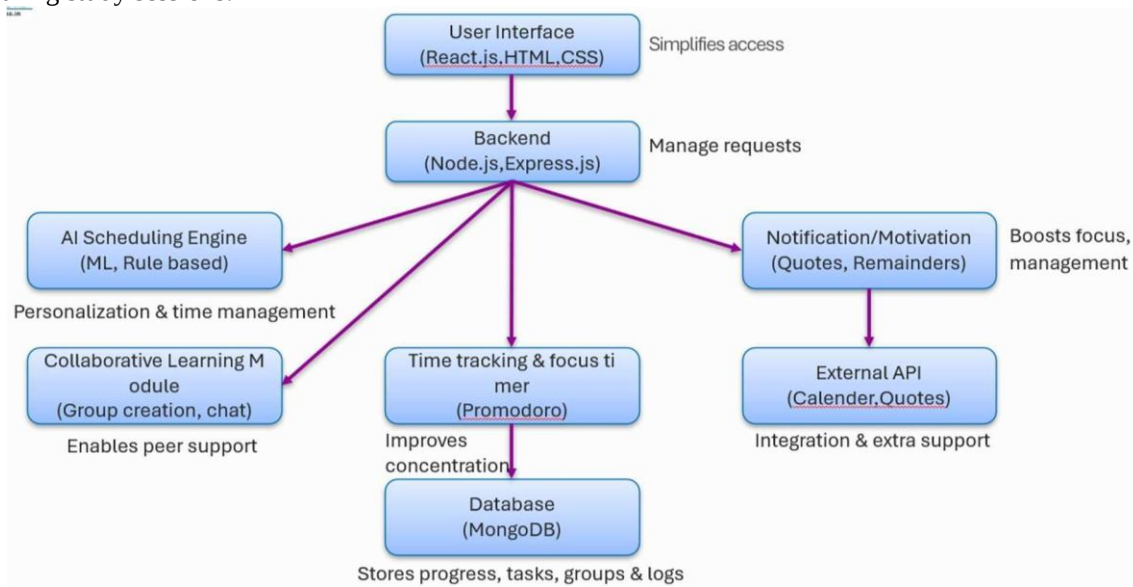


Fig 1 Proposed System Architecture Diagram.

2.5 Advantages of the Proposed System

1. Automated study schedule generation based on user inputs such as subjects, deadlines, and study preferences.
2. Improved time management and productivity for students through intelligent scheduling.
3. Better organisation of academic tasks, including subjects, assignments, and exam schedules.
4. Study reminders and notifications help students stay updated about upcoming tasks and deadlines.
5. Enhanced focus and learning efficiency using productivity tools such as a Pomodoro study timer.
6. User-friendly and scalable web-based platform suitable for students to manage their study activities efficiently.

3 METHODOLOGY AND ALGORITHM

The proposed Smart Study Planner system uses different algorithms to process user data, generate personalised study schedules, track study progress, and provide productivity support.

Algorithm 1: Data Preprocessing Algorithm

Steps:

1. Collect user input data such as subjects, assignment deadlines, exam schedules, and preferred study hours.
2. Remove incomplete or duplicate entries from the dataset.
3. Convert time-related inputs into a standard format.
4. Normalise study time values for consistent scheduling

This step ensures that study time values are scaled uniformly before generating the schedule.

Algorithm 2: Study Schedule Generation Algorithm Steps:

1. Input user study data, including subjects, deadlines, and available study hours.
2. Assign priority to subjects based on deadline proximity and difficulty level.
3. Distribute available study time among subjects.
4. Generate daily and weekly study plans.
5. Update schedules dynamically when new tasks are added

Algorithm 3: Study Progress Tracking Algorithm Steps:

1. Record completed study sessions by the user.
2. Calculate total study time for each subject.
3. Track progress based on completed sessions and remaining tasks.
4. Display progress using charts or statistics.

Algorithm 4: Pomodoro Timer Algorithm Steps:

1. Start study timer for a fixed focus session (e.g., 25 minutes).
2. After the study session ends, trigger a short break (e.g., 5 minutes).
3. Repeat the cycle for multiple study sessions.
4. Record completed Pomodoro sessions in the study progress log.

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4 IMPLEMENTATION RESULTS

4.1 Visual Implementation Results

The Smart Study Planner interface is designed with a clean and responsive layout for easy user interaction. The system includes interactive features such as study schedule dashboards, subject management forms, and progress tracking. Visual elements clearly display daily and weekly study plans, helping students manage their study activities efficiently.

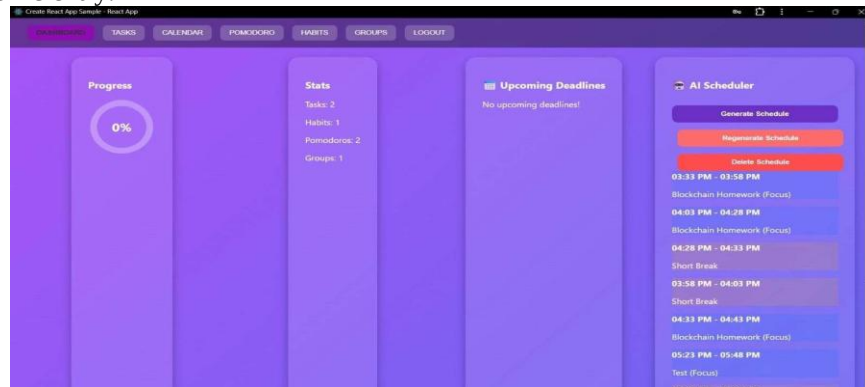


Fig. 1: Dashboard Interface.

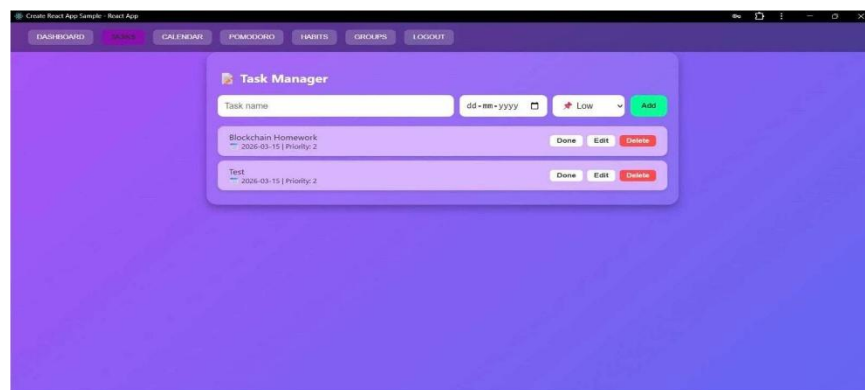


Fig 2: Task Management Interface of the Smart Study Planner System

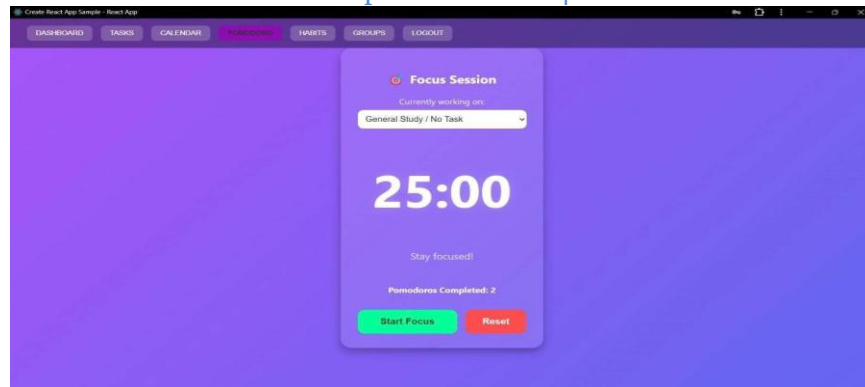


Fig 3: Pomodoro Timer Interface of the Smart Study Planner System.

4.2 System Architecture Implementation

The Smart Study Planner system follows a client-server architecture using modern web technologies. The frontend provides an interactive interface where students can manage subjects, deadlines, and study schedules. The backend handles user authentication, data processing, and schedule generation.

The system stores user data such as subjects, study schedules, and progress records in a database. The architecture ensures efficient communication between the user interface and backend services. The modular design improves scalability, maintainability, and system performance, making the platform suitable for managing personalised study planning.

4.3 Database Implementation

The **Smart Study Planner database** is designed to store and manage user data, study schedules, and academic activities efficiently. The database contains the following main tables:

- **Users Table:** Stores user authentication details and profile information such as name, email, and study preferences.
- **Subjects Table:** Contains subject details entered by users, including subject name, study hours, and priority level.
- **Assignments/Deadlines Table:** Maintains records of assignments, exam schedules, and their respective deadlines.
- **Study Schedule Table:** Stores the automatically generated daily and weekly study plans for each user.
- **Study Progress Table:** Tracks completed study sessions, Pomodoro timer usage, and overall study progress.

4.4 Authentication System Implementation

The **Smart Study Planner system** implements a secure authentication mechanism to protect user data and ensure authorised access. The authentication system includes the following features:

1. **Email and password-based login** for user registration and authentication.
2. **Secure password storage** using encrypted authentication methods.
3. **Session management** to maintain user login status during system usage.
4. **User access control** to allow only registered users to access study planner features.
5. **Protected routes** to ensure that personal study schedules and data are accessible only to the authenticated user.

4.5 System Results

The implemented **Smart Study Planner system** successfully provides the following results:

- **Personalised study schedules** generated based on subjects, deadlines, and user study preferences.
- **Efficient task management** for assignments, exams, and daily study activities.
- **Study progress tracking** through completed sessions and performance monitoring.
- **Improved productivity** using features such as reminders and Pomodoro-based study sessions.
- **User-friendly dashboards** that display study plans and progress clearly.

4.6 Module Implementation

Four main functional modules have been implemented in the **Smart Study Planner system** as part of the Minimum Viable Product (MVP):

- **Module 1: User Registration & Profile Management:** Allows students to register and log in securely. Users can create and update profiles with details such as subjects, study preferences, and available study hours.

- **Module 2:** Study Schedule Generation Module: Automatically generates personalised daily and weekly study plans based on subjects, deadlines, exam schedules, and preferred study time.
- **Module 3:** Study Progress & Dashboard Module: Provides an interactive dashboard where users can track completed study sessions, monitor progress, and view subject-wise study statistics.
- **Module 4:** Productivity Support Module: Includes tools such as reminders and a Pomodoro timer to help students stay focused, manage study time effectively, and improve overall productivity.

4.6 Performance Evaluation

The **Smart Study Planner system** was evaluated during development to ensure efficient performance and usability. The following results were observed:

- **Fast system response time** for generating personalised study schedules.
- **Efficient database operations** for storing and retrieving subjects, schedules, and progress data.
- **Quick loading of dashboards and study plans** for smooth user interaction.
- **Stable performance** when multiple users access the system simultaneously.
- **Reliable progress tracking and schedule updates** without noticeable delays.

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These performance results indicate that the **Smart Study Planner system is reliable, responsive, and suitable for practical student use.**

4.8 User Interface Implementation

The **Smart Study Planner frontend interface** is designed to provide a simple and interactive experience for students.

- **Component-based interface** developed for dynamic display of study schedules and dashboards.
- **Consistent styling and layout** used to maintain readability and usability.
- **Clean and simple design** with clear typography for a better user experience.
- **Interactive forms and dashboards** that allow users to manage subjects, schedules, and progress.
- **Responsive layout** that works smoothly on both desktop and mobile devices.

4.9 Security Implementation

The **Smart Study Planner system** includes several security measures to protect user data and ensure safe system usage.

- **Input validation** is applied to all user inputs to prevent invalid or harmful data.
 - **Secure database access** is maintained to store user profiles, study schedules, and progress information safely.
- **Authentication protection** ensures that only registered users can access their personal study planner.
- **Session management** is implemented to maintain secure user login during system usage.
- **Sensitive data protection** is ensured through secure configuration and controlled access.

These security mechanisms help maintain **data privacy, system reliability, and secure user interaction** within the Smart Study Planner platform.

5 CONCLUSIONS

The Smart Study Planner system provides an effective solution for students by integrating intelligent study scheduling, task management, and progress tracking within a single platform. The system helps students organise their subjects, assignments, and exam preparation efficiently while improving productivity through automated study planning.

The platform simplifies academic planning by generating personalized daily and weekly study schedules, tracking study progress, and supporting time management using productivity techniques. The implemented system demonstrates a reliable and user-friendly web-based solution that enhances students' study habits and academic performance.

This system also provides a foundation for future improvements such as AI-based adaptive scheduling, mobile application integration, and advanced analytics for study performance, which can further enhance the

learning experience.

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