WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Novel Smart Study Plan for the Students

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ABSTRACT :

In recent times, students have encountered significant challenges in effectively managing their academic tasks and assignments, often struggling to balance their studies, hobbies, and other activities. Creating a well-structured timetable and maintaining focus during study sessions are critical for academic success. To address these issues, we are developing a comprehensive web application designed to help students manage their academic commitments more efficiently. The application features a task and assignment tracker with due dates, a customized timetable generator, an AI chatbot to assist with academic doubts, and a focused study timer. By integrating these functionalities, the application aims to provide students with a holistic tool to enhance their academic performance and achieve a balanced lifestyle. The application is built using HTML, CSS, and JavaScript for the front-end, and Flask for the back-end. We believe this application will significantly support students in overcoming uncertainties related to their academic goals and help them achieve a well-rounded lifestyle.

KEYWORDS: Web Application, Study Schedule, Academic Management, AI Chatbot

INTRODUCTION

University students often struggle to balance academics, hobbies, and personal activities, leading to stress and reduced productivity. A well-structured timetable and effective study sessions are crucial for success, yet many lack the right tools. Existing solutions often fail to provide personalized and comprehensive academic management. To address this, we developed a web application designed to streamline student life. It includes a task and assignment tracker, a customized timetable generator, an AI chatbot for academic support, and a focused study timer. These features help students organize tasks, plan study sessions, and get real-time academic assistance. Our platform is built using HTML, CSS, JavaScript for the front-end, and Flask for the back-end. By leveraging modern technologies, we ensure a user-friendly and efficient experience. Whether preparing for exams, managing deadlines, or balancing extracurriculars, our application supports students in achieving their goals. It serves as a comprehensive tool for academic success and personal growth.

LITERATURE SURVEY

[2.1] Paramatmuni, S. S., Reddy, D. Y., Spoorthi, E. S., Dharani, A., & Sharma, K. V. (2024). Smart Timetable Generation using Genetic Algorithm. Macaw International Journal of Advanced Research in Computer Science and Engineering, 10(1s), 204-215.

This paper "Smart Timetable Generation using Genetic Algorithm" by Paramatmuni et al. (2024) paresents an efficient approach to automating timetable scheduling using Genetic Algorithms (GA). Timetable generation is a complex problem that involves allocating time slots for classes, teachers, and subjects while ensuring constraints such as avoiding clashes, balancing teacher workloads, and meeting institutional requirements. The study proposes using GA, an optimization technique inspired by natural selection, to create optimal timetables. The process begins with generating an initial set of possible timetables, which are evaluated based on predefined constraints. The best solutions are selected, and genetic operations like crossover and mutation are applied to improve them over multiple iterations. This method significantly reduces manual effort, minimizes scheduling conflicts, and optimizes resource utilization. The results indicate that GA-based timetable generation is efficient, accurate, and adaptable to various constraints, making it a valuable solution for educational institutions.

[2.2] Muhammad, S. H., Galadanci, B. S., Mustapha, A., & Yahaya, A. S. (2017). Design and implementation of an android and web-based university timetable customization system. Bayero Journal of Pure and Applied Sciences, 10(1), 320-325.

The paper **"Design and Implementation of an Android and Web-Based University Timetable Customization System"** by **Muhammad et al. (2017)** presents a solution for efficient timetable management in universities through a web and Android-based system. Traditional timetable management methods often face issues such as scheduling conflicts, inefficient resource allocation, and limited accessibility. To address these challenges, the authors developed a system that allows students and faculty to access, customize, and manage their schedules easily. The web-based platform enables administrators to create and manage timetables, while the Android application provides mobile access for users to view and

personalize their schedules. Key features of the system include conflict detection, course selection, and notifications. The system was implemented using PHP, MySQL, and JavaScript for the web platform, and Java for the Android application.

[2.3] Liyanage et al. (2021) combined design thinking and user-centered design (UCD) to develop an effective time management assistant mobile app.

The paper "Design-Thinking and UCD Combination for Designing Effective Time Management Assistant Mobile App" by Liyanage et al. (2021) explores how Design Thinking and User-Centered Design (UCD) methodologies can be combined to create an effective and user-friendly time management mobile app. The authors identify that many existing time management apps are either too complex or lack personalization, making it challenging for users to effectively organize their tasks. To address this, the team applied Design Thinking, which focuses on understanding user problems and creating innovative solutions through prototyping and testing, alongside User-Centered Design (UCD), which prioritizes user needs and behaviors. The resulting app features task organization, user customization, intuitive navigation, and progress tracking to help users manage their time more effectively. By integrating these two methodologies, the app is designed to be simple, engaging, and aligned with user expectations, making it a valuable tool for improving time management.

[2.4] Bradáč, V., Smolka, P., Kotyrba, M., & Průdek, T. (2022). Design of an intelligent tutoring system to create a personalized study plan using expert systems. Applied Sciences, 12(12), 6236.

The paper "Design of an Intelligent Tutoring System to Create a Personalized Study Plan Using Expert Systems" by Bradáč et al. (2022) explores the development of an intelligent tutoring system (ITS) that leverages expert systems to provide personalized study plans. Traditional educational approaches often follow a standardized method that does not account for individual learning needs, leading to inefficiencies in student progress. To address this, the proposed ITS analyzes student performance, learning pace, and knowledge gaps to dynamically adjust study plans. By integrating expert systems, the tutoring system can assess students' strengths and weaknesses, recommend appropriate learning materials, and modify content difficulty based on progress. Key features of the system include personalized learning paths,
automated feedback, adaptive difficulty levels, and seamless integration with existing e-learning platforms. The study highlights that such an approach enhances learning efficiency by tailoring content to each student, promoting self-paced learning, and reducing the dependency on direct teacher intervention.

[2.5] Humphrey Jr, W., Laverie, D., & Shields, A. (2021). Exploring the effects of encouraging student performance with text assignment reminders. Journal of Marketing Education, 43(1), 91-102.

The study "Exploring the Effects of Encouraging Student Performance with Text Assignment Reminders" by Humphrey Jr., Laverie, and Shields (2021) examines how text message reminders impact student performance and engagement in academic settings. The researchers explore whether sending regular reminders about assignments, deadlines, and coursework improves students' ability to complete tasks on time and enhances their overall academic success. The study highlights that procrastination and forgetfulness are common challenges among students, and implementing text-based reminders may serve as an effective intervention to improve time management and task completion. Findings suggest that students who receive timely reminders are more likely to submit assignments on time, participate actively in coursework, and demonstrate better academic performance compared to those who do not receive such prompts. Additionally, the study discusses how text reminders contribute to fostering a sense of accountability and motivation, especially in online and hybrid learning environments.

Tittle	**Advantages**	**Disadvantages**	**Algorithms and Techniques used**
Designing Effective Sustainability Assignments: How and Why Definitions of Sustainability Impact Assignments and Learning Outcomes.	• Clarification of Sustainability Definitions. • Focus on Assignment Design.	• Limited Scope of Sustainability Definitions. • Limited Focus on Challenges in Implementation	Conceptual and theoretical discussions related to the design of sustainability assignments in higher education.
Designing Effective Sustainability Assignments: How and Why Definitions of Sustainability Impact Assignments and Learning Outcomes.	• Guidance for Educators on Assignment Design. • Encourages Interdisciplinary Learning	• Lack of Empirical Evidence. • Insufficient Focus on Student Experience.	The paper primarily focuses on **theoretical and conceptual analysis** of assignments and learning outcomes.

Exploring the Effects of Encouraging Student Performance with Text Assignment Reminders	• Evidence-Based Approach. • Low-Cost Intervention	• Limited Scope of Intervention. • Absence of a Control Group.	The paper does not use specific ML and **algorithms** but relies on **statistical techniques** to analyze the impact of the intervention.
Impact of Degree Program Satisfaction on the Persistence of College .	• Insight into Student Retention. • Focus on Satisfaction as a Key Factor.	• Focus on Satisfaction Alone. Generalization to Non- Traditional Students	Common techniques used in such research include **regression analysis** to determine the strength and significance of various factors.
Application and Analysis of the Construction of Career Planning Goal System for Lifelong	• Integration of AI with Education. • Support for Lifelong Education.	• Dependence on Data Quality. • Complexity and Accessibility.	Machine learning algorithms such as **decision trees**, **support vector machines**
Education Based on Artificial Intelligence Algorithm.			**(SVM)**, and **random forests.**
A Deep Learning Approach to Predict Academic Result and Recommend Study Plan for Improving Student's Academic Performance.	• Accurate Prediction of Academic Performance. • Personalized Study Plan Recommendations.	• Complexity of Deep Learning Models. • Challenges in Real-World Implementation	The study may employ **supervised learning algorithms** such as **linear regression**, **logistic regression**, and **decision trees.**
Design of an Intelligent Tutoring System to Create a Personalized Study Plan.	• Personalized Learning Experience. • Increased Learning Efficiency.	• Dependence on High-Quality Data. • Potential for Algorithmic Bias	The primary methodology in the paper is **expert systems**, supported by **decision trees, fuzzy logic, constraint-solving techniques.**
E-Learning Systems: Intelligent Techniques for Personalization.	• Personalized Learning Experience. • Improved Student Engagement	• High Dependence on Technology and Infrastructure. • Difficulty in Handling Complex Learning Needs.	**Machine learning algorithms** such as **decision trees, support vector machines (SVMs), and neural networks** are used to analyze student.
Features and Trends of Personalised Learning: A Review of Journal Publications from 2001 to 2018.	• Comprehensive Review of Personalised Learning Trends. • Helps in Policy and Decision- Making.	• Potential Bias in Journal Selection. • Possible Over-Reliance on Technology.	Use of data analysis techniques to monitor and predict student performance and learning experiences.

METHODOLOGY

[3.1] Paramatmuni et al. (2024) proposed a smart timetable generation method using a genetic algorithm.

1. **Problem Formulation & Encoding (Chromosome Representation)**

- The timetable generation is treated as an optimization problem.
- Timetables are encoded as chromosomes, where each gene represents a timeslot, room, or teacher assignment.
- Technologies: Data Structures, Constraint Modeling

2. **Initial Population Generation**

- A random population of chromosomes (schedules) is generated as the starting point.
- Ensures diversity in solutions for better exploration.
- Technologies: Randomization Algorithms, Data Initialization

3. **Fitness Function Definition**

- A fitness function evaluates the quality of timetables based on:
  - Constraint satisfaction (room availability, teacher schedules, no clashes)
  - Optimal resource utilization (balanced workload, minimal gaps)
- Technologies: Mathematical Modeling, Constraint Satisfaction Programming (CSP)

[3.2] Muhammad et al. (2017) designed and implemented an Android and web-based system for university timetable customization.

1. **Requirement Gathering & Problem Analysis**

- Method: Conducted a survey with 300 students & 50 lecturers to identify issues in the existing timetable system.
- Technology Used: Descriptive Statistics for analyzing survey data.

2. **System Design & Development Approach**

- Method: Followed the Waterfall Model, a step-by-step approach to system development.
- Technology Used: Software Design Principles to ensure structured development.

3. **Application Development**

- Method: Developed an Android and web-based timetable system.
- Technology Used:
  - Java, Android Studio for Android app development.
  - PHP for web-based application.
  - MySQL for database storage and management.

[3.3] Liyanage et al. (2021) combined design thinking and user-centered design (UCD) to develop an effective time management assistant mobile app.

1. **Discovery Phase – Understanding User Needs**

- Methods: Surveys, Interviews, Thematic Analysis
- Technologies: Google Forms, Qualtrics, NVivo (for qualitative data analysis)
- Goal: Gather insights from 30 participants about time management habits and challenges.

2. **Data Analysis & Insight Extraction**

- Methods: Thematic Analysis (identifying key patterns and themes in user responses)
- Technologies: NVivo, MAXQDA (for qualitative data coding and analysis)
- Goal: Extract meaningful insights to shape app features based on real user needs.

3. **Ideation & Concept Development**

- Methods: Workshops, Brainstorming Sessions, KJ Method (prioritization of ideas)
- Technologies: Miro, MURAL, Trello (for collaborative idea generation and organization)
- Goal: Generate and prioritize app ideas with 10 participants to focus on essential features.

4. **Prototyping & Iterative Testing**

- Methods: Low-Fidelity & High-Fidelity Prototyping, Usability Testing
- Technologies: Figma, Adobe XD, Balsamiq (for wireframing and prototyping)
- Goal: Create low-fidelity prototypes tested with 10 users, refine them into high-fidelity prototypes tested with 20 users.

5. **Usability Evaluation & Feedback Analysis**

- Methods: System Usability Scale (SUS), User Feedback Collection
- Technologies: SUS Score Calculation Tools, Google Analytics, Hotjar (for behavior tracking)
- Goal: Measure the app's usability and effectiveness, refining it further based on user

[3.4] Bradáč et al. (2022) designed an intelligent tutoring system that creates personalized study plans using expert systems.

1. **Literature Review & Requirement Analysis**

- Method: Systematic literature review
- Technology Used: Research databases, academic papers
- Purpose: Identify key components of an ITS and expert systems based on educational theories and pedagogy.

2. **Knowledge Base & Rule Base Definition**

- Method: Data collection & knowledge engineering
- Technology Used: CLIPS (C Language Integrated Production System)
- Purpose: Populate the knowledge base with educational theory, pedagogy, and learning psychology; develop rule-based logic for personalized recommendations.

3. **ITS Architecture Design**

- Method: System architecture design
- Technology Used: Expert system framework, decision trees
- Purpose: Create a modular structure with three key components—Student Modeling, Expert System, and Personalized Study Plan Generator.

[3.5] Humphrey Jr. et al. (2021) explored how text assignment reminders impact student performance.

1. **Study Design & Participant Selection**

- Methods: Quasi-experimental design, random group assignment (treatment vs. control)
- Technologies: University student enrollment system, Excel/SPSS for participant grouping
- Goal: Select 246 marketing students from a large public university and assign them to treatment and control groups.

2. **Intervention – Sending Text Reminders**

- Methods: Mobile messaging platform, scheduled reminders
- Technologies: SMS API (e.g., Twilio, WhatsApp Business API), automated messaging tools
- Goal: Send assignment due dates, times, and locations only to the treatment group.

3. **Data Collection on Student Performance**

- Methods: Tracking assignment completion, exam scores, and overall course grades
- Technologies: Learning Management System (LMS) (e.g., Moodle, Blackboard), university grading system
- Goal: Gather performance metrics to compare treatment and control groups.

4. **Statistical Analysis & Performance Comparison**

- Methods: ANOVA (Analysis of Variance), Regression Analysis
- Technologies: SPSS, R, Python (NumPy, SciPy, Statsmodels)

- Goal: Identify significant differences in performance between the two groups.

5. Results Interpretation & Impact Assessment

- Methods: Statistical result interpretation, discussion of findings, implications for education
- Technologies: Data visualization tools (Tableau, Matplotlib, Excel)
- Goal: Demonstrate that text reminders positively influence assignment completion and exam performance**.**

Proposed Methodology

1. System Overview

The proposed web application is designed to help students efficiently manage their academic tasks, assignments, study schedules, and focus sessions. It integrates multiple features, including a task tracker, assignment tracker, customized timetable generator, AI chatbot for academic support, and a focused study timer. The application is built using modern web technologies such as HTML, CSS, JavaScript for the front-end and Flask for the back-end, ensuring a seamless and user-friendly experience.

2. System Architecture

The system follows a modular approach where each feature functions independently but integrates smoothly for an enhanced user experience. The key components include:

- Front-end (User Interface):
  - Developed using HTML, CSS, and JavaScript.
  - Provides an intuitive dashboard where students can access all features.
  - Uses local storage and real-time data fetching for task and assignment tracking.
- Back-end (Server & Database):
  - Developed using Local storage to handle user requests and data storage.
  - Manages interactions between the user and the system.
  - Facilitates AI-based query resolution through external APIs (like OpenAI's API for the chatbot).
- Data Storage & Retrieval**:**
  - Tasks and assignments are stored in **localStorage** to ensure persistence.
  - Future enhancements may include a database for cloud-based storage.
  - The system retrieves and updates data dynamically for real-time tracking.

3. Functional Modules

The system consists of the following key modules:

A. Task Tracker

- Allows students to **add, edit, delete, and track** tasks with due dates.
- Tasks remain saved in local storage until removed by the user.
- Displays overdue and upcoming tasks for easy tracking.

B. Assignment Tracker

- Students can **log assignments with due dates** and track progress.
- Assignments can be marked as **completed or pending**.
- Provides a clear timeline of upcoming deadlines.

C. Customized Timetable Generator

- Users can input **available free time, subjects, and priorities**.
- The system generates an **optimized study schedule**.
- Helps students allocate study time efficiently before exams.

D. AI Chatbot for Academic Support

- Integrates an AI-based **Q&A system** using OpenAI's API.
- Students can ask academic questions and receive instant answers.
- Enhances self-learning by providing real-time academic assistance.

E. Focused Study Timer

- Implements a **Pomodoro-style** study timer.
- Helps students maintain focus and avoid distractions.
- Tracks study sessions to improve time management.

4. User Experience & Interface Design

- **Dashboard:** A central hub displaying tasks, assignments, timetable, chatbot, and timer.
- **Interactive Cards:** Each feature is presented as a card with an intuitive UI.
- **Smooth Navigation:** Users can easily switch between features.
- **Real-time Updates:** The system updates dynamically without requiring manual refreshes.

5. Technology Stack

Component	Technology Used
Front-end	HTML, CSS, JavaScript
Back-end	Local storage to store input data
AI Chatbot	OpenAI API
Storage	Local Storage (Future: Database)

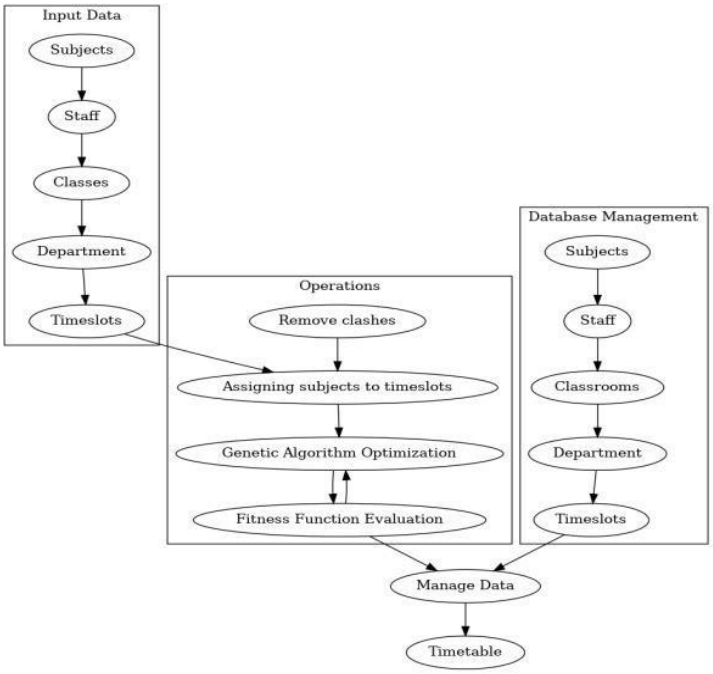
6. Implementation Strategy

- **Phase 1: UI Development**
  - Design and develop the front-end interface.
  - Ensure smooth navigation and user-friendly interaction.
- **Phase 2: Feature Integration**
  - Implement task tracker, assignment tracker, timetable generator, and timer.
  - Integrate AI chatbot using OpenAI's API.

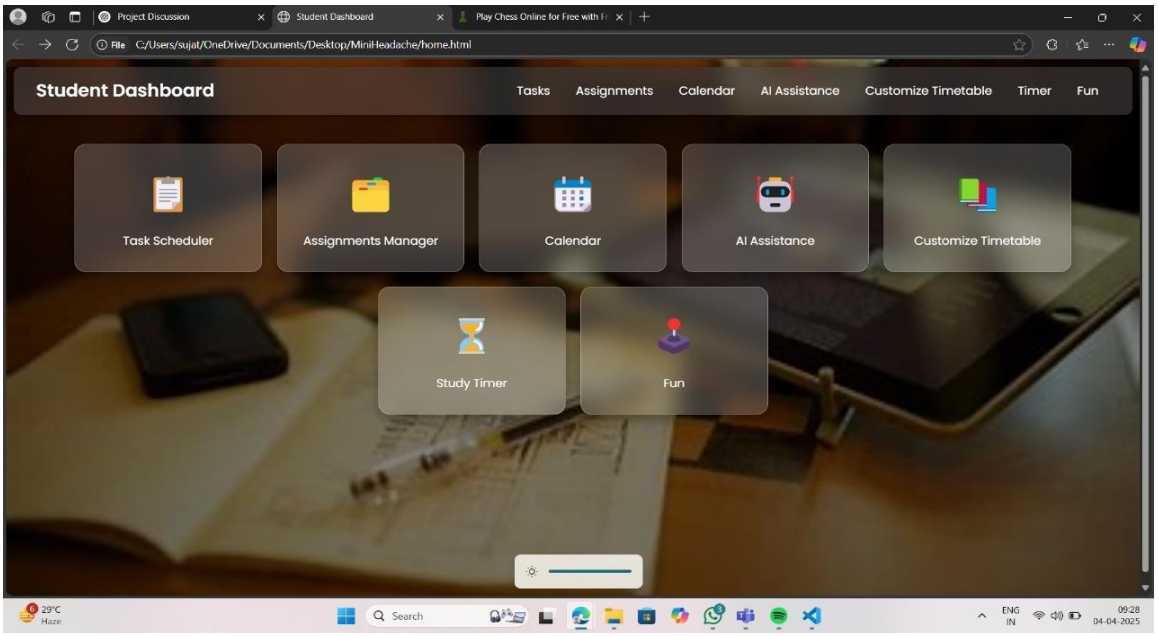
. Phase 3: Testing & Optimization

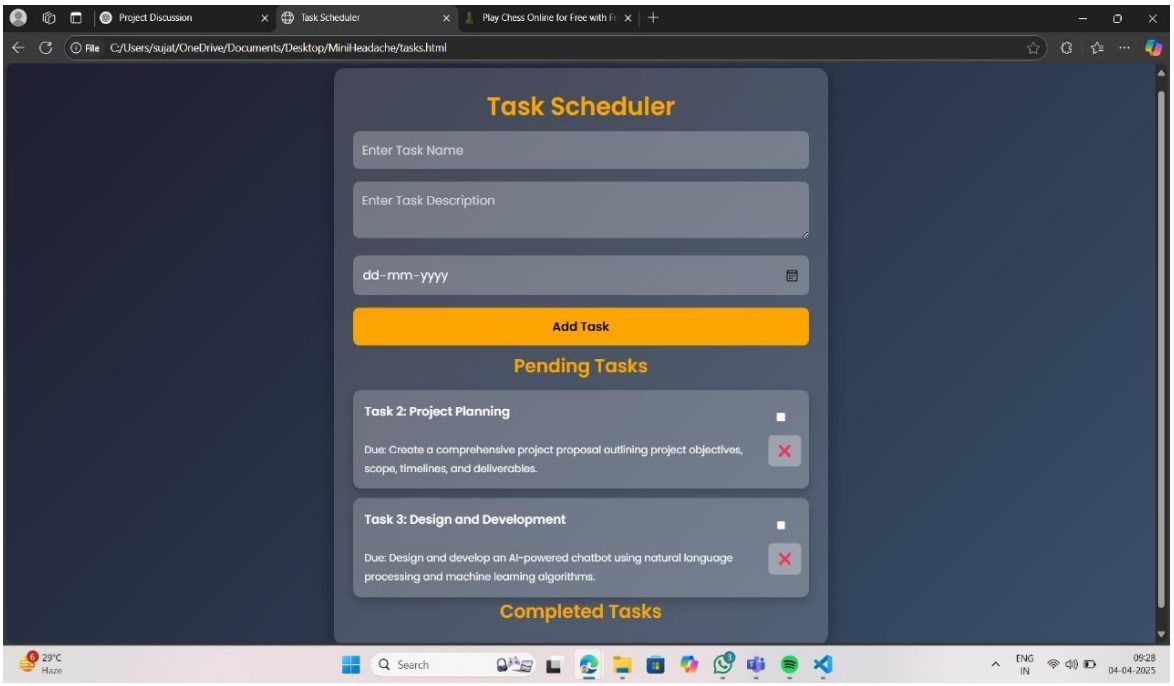
- Conduct functional and user testing to identify bugs.
- Optimize performance and improve usability based on feedback.

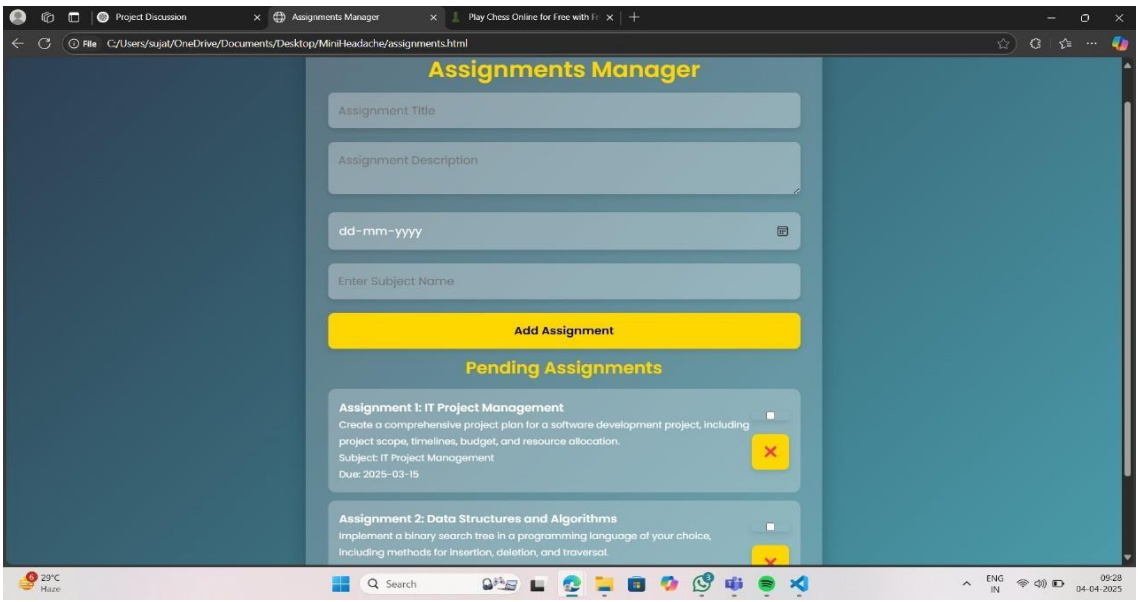
Flow chart

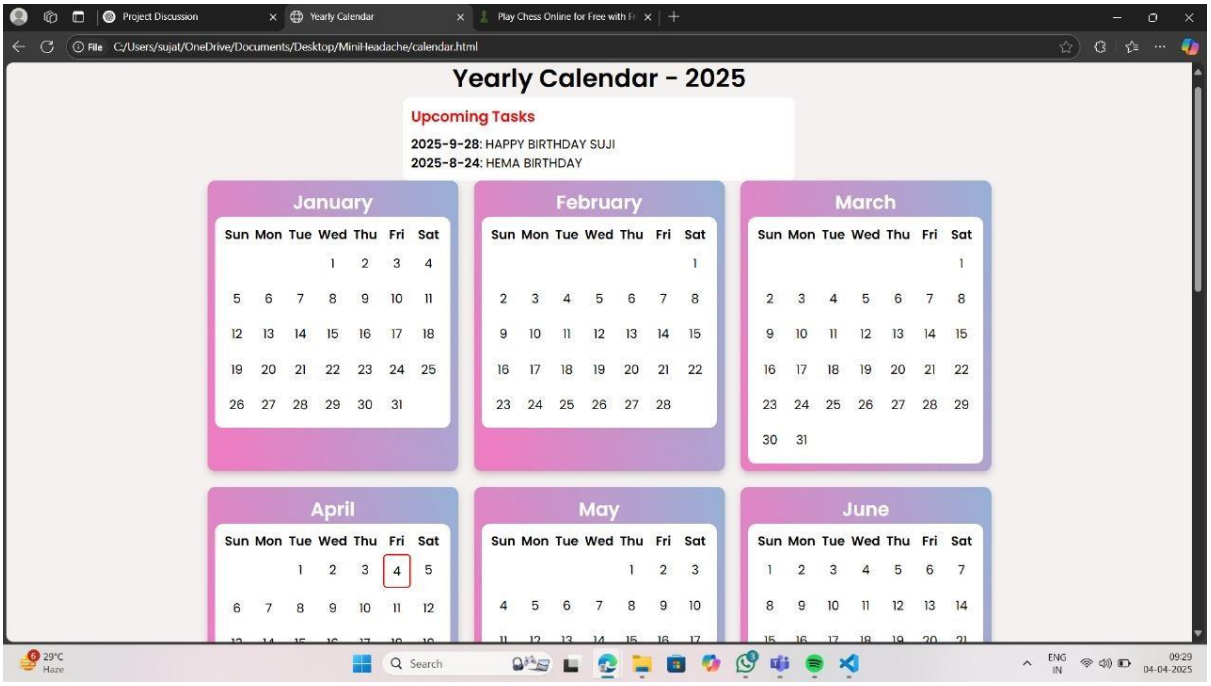


RESULTS AND CONCLUSION





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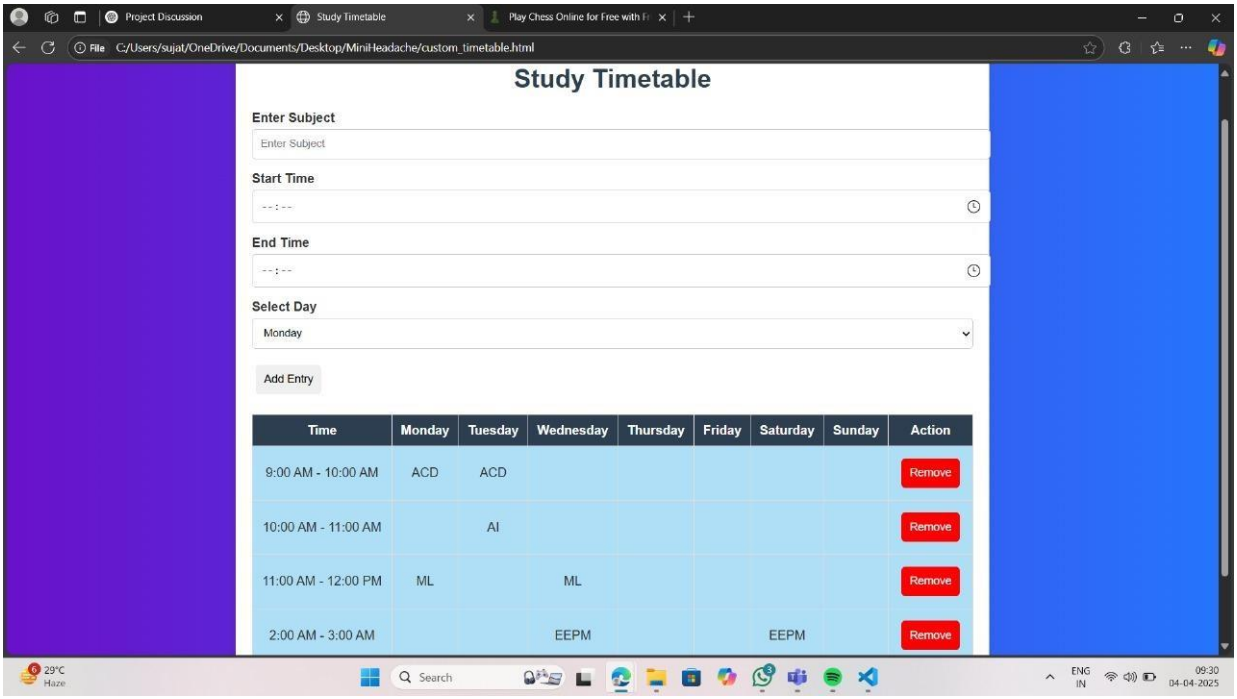
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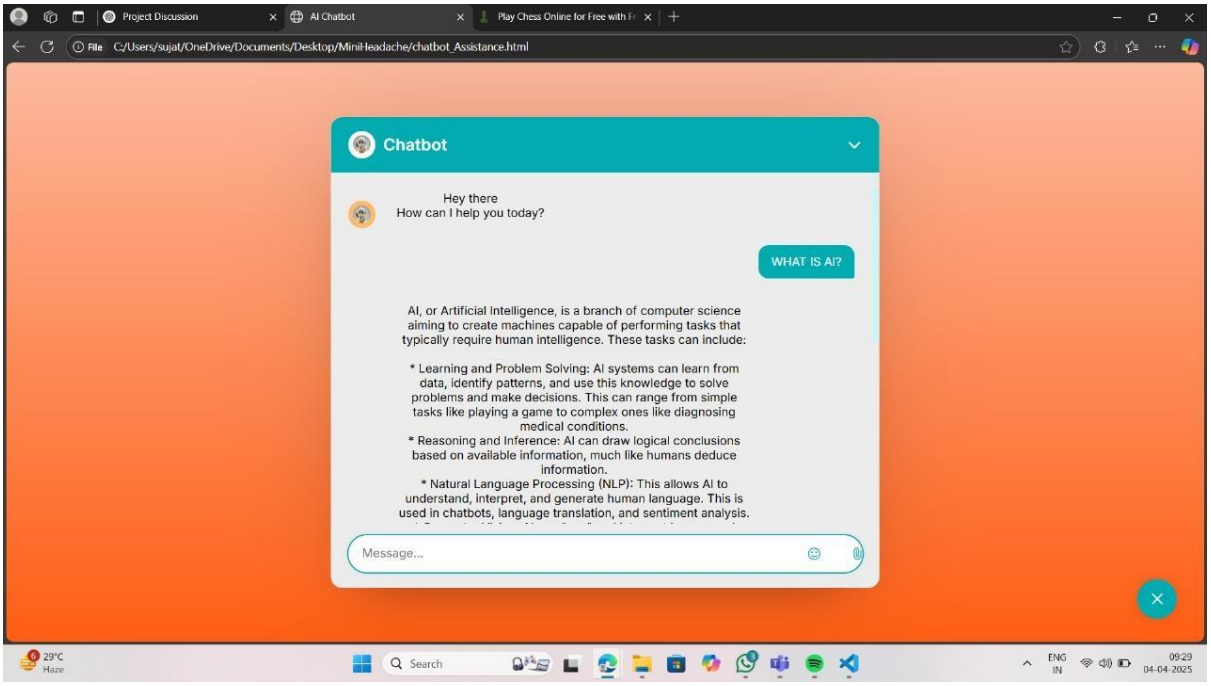
Project Discussion
AI Chatbot
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Chatbot
Hey there
How can I help you today?
WHAT IS AI?
AI, or Artificial Intelligence, is a branch of computer science aiming to create machines capable of performing tasks that typically require human intelligence. These tasks can include:
* Learning and Problem Solving: AI systems can learn from data, identify patterns, and use this knowledge to solve problems and make decisions. This can range from simple tasks like playing a game to complex ones like diagnosing medical conditions.
* Reasoning and Inference: AI can draw logical conclusions based on available information, much like humans deduce information.
* Natural Language Processing (NLP): This allows AI to understand, interpret, and generate human language. This is used in chatbots, language translation, and sentiment analysis.
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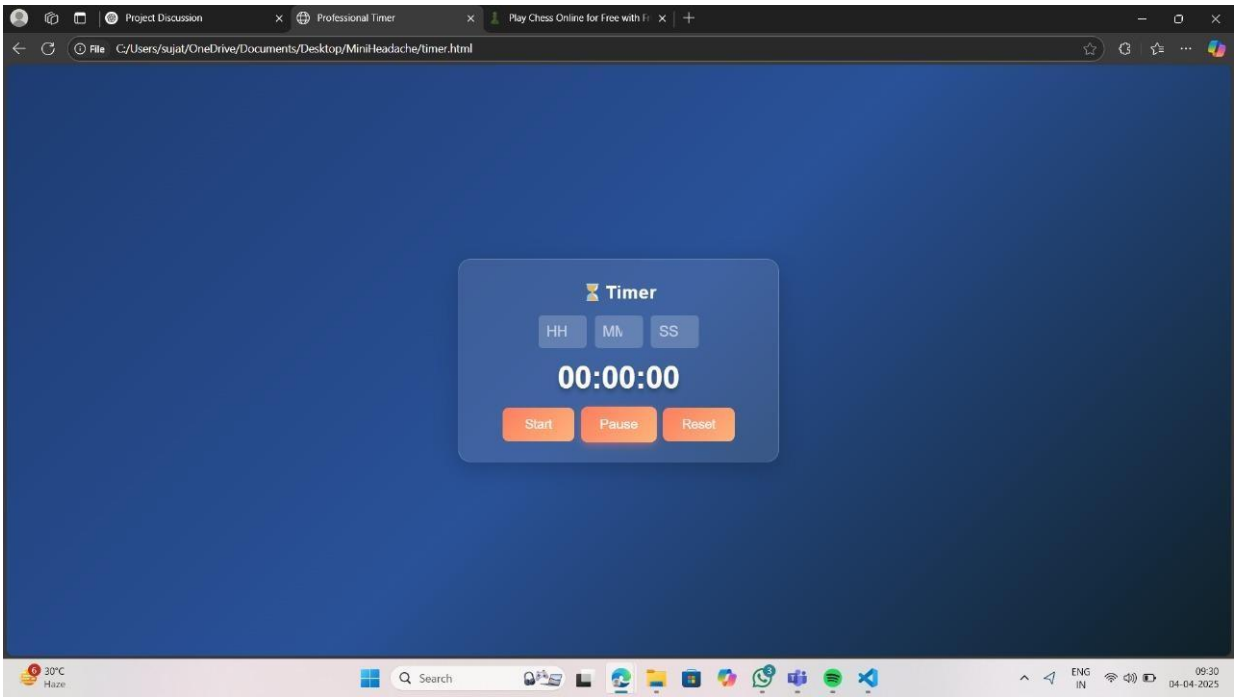
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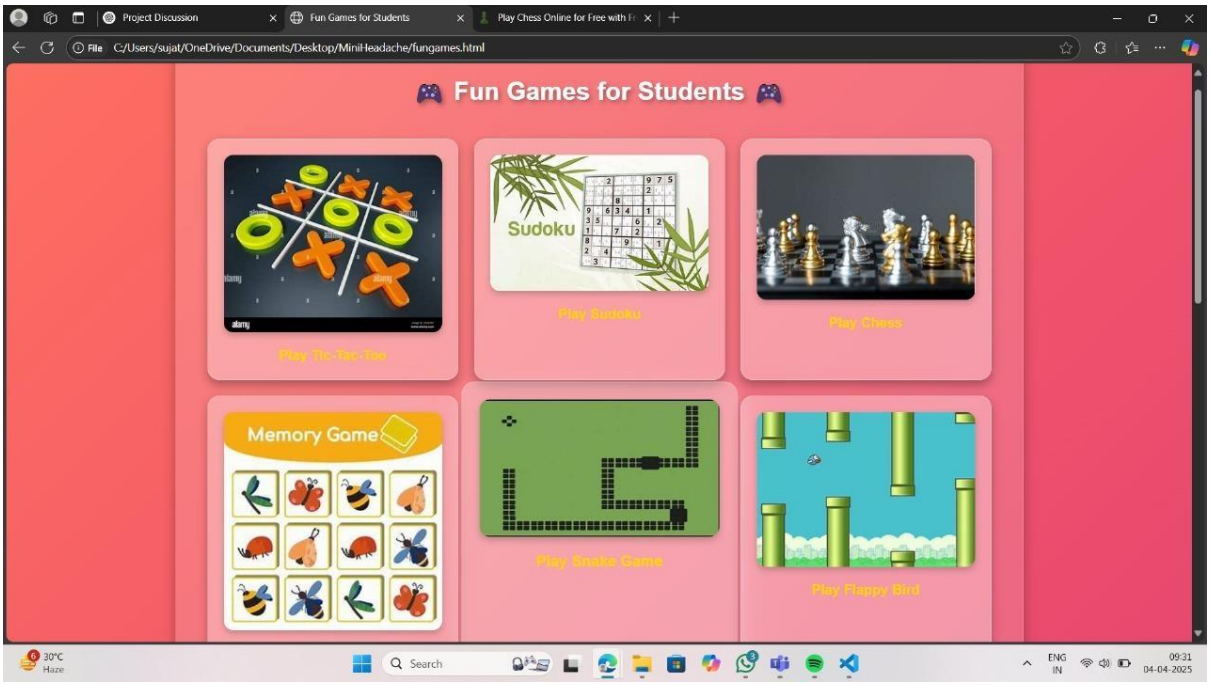

CONCLUSION

In conclusion, managing academic tasks and assignments effectively is a major challenge for students, as they often struggle to balance their studies, hobbies, and other commitments. To address this issue, we have developed a comprehensive web application that integrates multiple features aimed at improving time management and academic performance. The application includes a task and assignment tracker with due dates to help students stay organized, a customized timetable generator to create structured study plans, an AI chatbot to provide academic assistance, and a focused study timer to enhance concentration during study sessions. By combining these functionalities, the platform serves as an all-in-one solution to support students in overcoming uncertainties related to their academic goals. The front-end of the application is built using HTML, CSS, and JavaScript, ensuring a user-friendly and interactive experience. By leveraging these technological advancements, we aim to provide students with an effective tool that not only streamlines their academic management but also promotes a balanced lifestyle, ultimately contributing to their overall success.

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