

Hackathon Project

Project Title:

StudBud

Team Name:

Script Squad

Team Members:

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Phase-1: Brainstorming & Ideation

Objective:

The objective of the AI Study Planner is to develop an intelligent system that creates personalized and adaptive study schedules for students. By leveraging artificial intelligence, the planner will analyze learning habits, deadlines, subject difficulty, and available study time to generate optimized schedules. It will provide real-time adjustments, progress tracking, and smart recommendations to enhance productivity and academic performance. The goal is to help students manage their time effectively, stay organized, and improve learning outcomes through a user-friendly and efficient solution.

Key Points:

1. Problem Statement:

Students often struggle with managing their study schedules effectively due to poor time management, lack of personalized planning, and difficulty in balancing multiple subjects and deadlines. Traditional study planners and manual scheduling methods fail to adapt to individual learning styles, progress, and changing priorities, leading to inefficiency and decreased academic performance.

The absence of an intelligent, data-driven approach to study planning results in procrastination, stress, and missed deadlines. There is a need for an AI-powered study planner that can dynamically create, adjust, and optimize study schedules based on a student's learning patterns, priorities, and available time. Such a system would help students stay organized, maximize productivity, and improve their academic success.

2. Proposed Solution:

To address the challenges of ineffective study planning, the AI Study Planner will provide an intelligent, automated, and adaptive scheduling system. The proposed solution leverages artificial intelligence to analyze a student's learning patterns, subject difficulty, deadlines, and available time to generate a personalized and optimized study plan.

Key features of the AI Study Planner include:

- **Personalized Scheduling:** Generates study plans tailored to individual learning styles and academic goals.
- **AI-Driven Adaptability:** Continuously adjusts schedules based on progress, priorities, and real-time changes.
- **Task Prioritization:** Helps students focus on urgent and high-priority topics to meet deadlines effectively.
- **Progress Tracking & Analytics:** Monitors study habits and provides insights to improve efficiency.

- **Smart Reminders & Notifications:** Ensures students stay on track with automated alerts.
- **User-Friendly Interface:** Provides an intuitive platform for easy interaction and customization.

By implementing this AI-powered study planner, students will be able to manage their time more effectively, reduce stress, and enhance their academic performance through a structured and intelligent approach to studying.

3. Target Users:

The AI Study Planner is designed for a diverse range of users who need efficient and personalized study management. The primary target users include:

1. Students:

- High School Students** – To help them manage assignments, exams, and extracurricular activities effectively.
- College & University Students** – To balance coursework, projects, and exam preparation while optimizing their study schedules.
- Competitive Exam Aspirants** – To ensure structured preparation for standardized tests (e.g., SAT, GRE, GMAT, UPSC, etc.).

2. Educators & Tutors:

- To assist in recommending study schedules for students and tracking their progress.
- To provide structured study plans for personalized learning approaches.

3. Working Professionals & Lifelong Learners:

- For individuals pursuing online courses, certifications, or skill development while managing a busy schedule.

4. Parents & Guardians:

- To monitor and support their children's study routines by ensuring effective learning strategies.

4. Expected Outcome:

The AI Study Planner is expected to provide an intelligent and adaptive study scheduling system that enhances students' learning efficiency and time management. The key expected outcomes include:

1. **Personalized Study Plans:** AI-driven schedules tailored to individual learning styles, subject difficulty, and deadlines.
2. **Improved Time Management:** Optimized study sessions that help students balance their workload effectively.
3. **Enhanced Academic Performance:** Better retention, understanding, and progress tracking to maximize learning outcomes.
4. **Reduced Stress & Procrastination:** Smart reminders, prioritization, and real-time adjustments to keep students on track.
5. **Data-Driven Insights:** Performance analytics to help students understand their study habits and improve productivity.
6. **User Engagement & Satisfaction:** A seamless, user-friendly interface that encourages regular use and habit formation.

Ultimately, the AI Study Planner aims to empower students, educators, and lifelong learners with an intelligent tool that fosters consistency, discipline, and academic success.

Phase-2: Requirement Analysis

Objective:

The objective of the requirement analysis for the AI Study Planner is to systematically identify, define, and document the functional and non-functional requirements needed for the successful development of the system. This process ensures that the final product meets user needs, aligns with project goals, and operates efficiently.

Key Objectives:

- **Identify User Needs:** Understand the expectations, challenges, and preferences of students, educators, and other target users.
- **Define Functional Requirements:** Specify core features such as AI-driven scheduling, task prioritization, progress tracking, and reminders.
- **Establish Non-Functional Requirements:** Address system performance, scalability, security, and usability aspects.
- **Ensure Feasibility:** Analyze technical, financial, and operational constraints to determine the practicality of implementation.
- **Create a Clear Development Roadmap:** Provide structured guidelines for system architecture, design, and implementation phases.

By conducting a thorough requirement analysis, the AI Study Planner will be developed as a user-centric, efficient, and intelligent study management tool.

Technical Requirements:

The technical requirements define the necessary specifications, technologies, and infrastructure needed for the development and deployment of the AI Study Planner.

1. System Requirements

- **Operating System:** Cross-platform support (Windows, macOS, Linux, Android, iOS)
- **Hardware Requirements:**
 - Minimum 4GB RAM (for mobile devices)
 - Minimum 8GB RAM, multi-core processor (for web/desktop)
 - Stable internet connection for cloud-based features

2. Functional Requirements

- **User Authentication & Profile Management**
 - Sign-up/Login via email, Google, or social media
 - User dashboard with study preferences and progress tracking
- **AI-Based Study Scheduling**
 - Dynamic scheduling based on deadlines, priorities, and learning patterns
 - Adaptive learning adjustments based on performance
- **Task Management & Reminders**
 - To-do list integration with deadlines
 - Push notifications, email, and in-app alerts
- **Progress Tracking & Analytics**
 - Performance insights and study habit analysis
 - Visual reports (graphs, charts) for study efficiency
- **Multi-Device Synchronization**
 - Cloud-based data storage to sync schedules across devices

3. Non-Functional Requirements

- **Performance:**
 - Fast response time (less than 2 seconds for schedule generation)
 - Efficient AI algorithms for real-time updates
- **Scalability:**
 - Support for multiple users with cloud-based architecture
 - Ability to handle concurrent user requests efficiently
- **Security & Privacy:**
 - Data encryption for user information and study plans
 - Secure authentication and access control mechanisms

4. Technology Stack

- **Frontend:** React.js , Flutter / React Native,HTML,CSS
- **Backend:** Node.js with Express ,TypeScript,Vite,JavaScript
- **AI & Machine Learning:** TensorFlow/PyTorch for adaptive learning and recommendation systems

By fulfilling these technical requirements, the AI Study Planner will ensure seamless functionality, high performance, and user satisfaction.

Phase-3: Project Design

To ensure a seamless and efficient AI-powered study planner, the following technology stack has been selected for development:

1. Frontend:

- Frameworks & Libraries: React.js (for web), Flutter / React Native (for mobile)
- Core Technologies: HTML, CSS, JavaScript, TypeScript
- UI Styling: Tailwind CSS, Material-UI

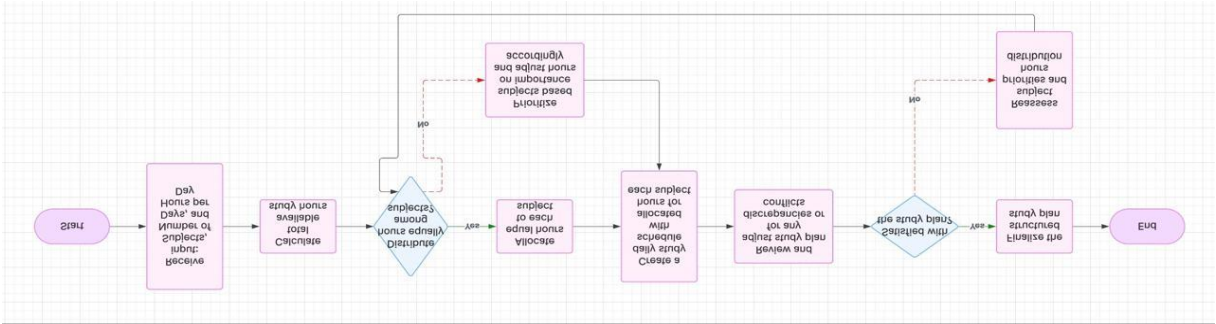
2. Backend:

- Frameworks & Libraries: Node.js with Express.js
- Languages: TypeScript, JavaScript
- Build Tools: Vite for optimized development

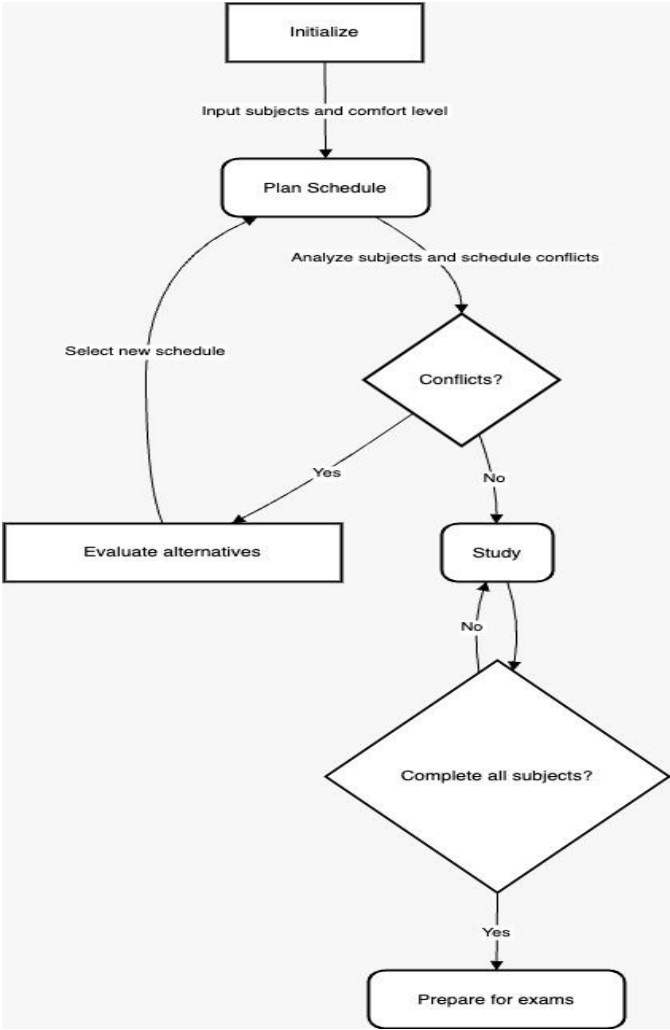
3. AI & Machine Learning:

- Libraries & Frameworks: TensorFlow, PyTorch
- Use Cases: Adaptive learning models, recommendation systems for personalized study plans

System Architecture Diagram:



User Flow:



Phase-4: Project Planning

Objective:

The objective of planning using Agile methodologies in the AI Study Planner project is to ensure a flexible, iterative, and user-centered development process. Agile planning aims to enhance collaboration, adaptability, and efficiency by breaking the project into manageable increments, allowing continuous improvements based on feedback.

Key Points:

1. Sprint Planning:

- **Sprint Duration:** 2 days
- **Team Members:** 4 (2 Frontend Developers, Backend Developer, Documentarian)
- **Sprint Goal:** Develop core functionalities of the AI Study Planner

2. Task Allocation:

1. Frontend Developer 1

- Design and develop User Authentication Screens (Login/Signup)
- Implement Dashboard UI for Study Plan Display
- Ensure mobile & desktop responsiveness

2. Frontend Developer 2

- Develop Task Management UI (Add/Edit/Delete Tasks)
- Implement Progress Tracking & Visualization (Graphs, Charts, etc.)
- Integrate frontend components with backend API

3. Backend Developer

- Set up User Authentication System (JWT-based login/signup)
- Develop API for Study Plan Generation
- Implement Task Management API (CRUD operations)

4. Documentarian

- Prepare and update Project Documentation (Requirement Analysis, System Architecture, APIs)
- Create User Guides & Tutorials for the application
- Maintain Sprint Reports & Meeting Notes
- Collect feedback from team members and refine documentation

3. Timeline & Milestones:

In **Day 1**, the team will set up the project and begin core development. Frontend developers will work on authentication screens, the dashboard, and task management UI, while the backend developer will set up authentication and develop APIs. The documentarian will draft API documentation and a user guide. By the end of the day, the UI and backend should be functional, with initial documentation ready.

On **Day 2**, the focus will be on integration, testing, and deployment. The frontend and backend will be connected, followed by UI and API testing. The documentarian will refine the documentation based on feedback. Once testing is complete, the backend developer will deploy the system. The sprint will conclude with a review, bug fixes, and a retrospective for improvements.

Phase-5: Project Development

Objective:

The objective of developing the AI Study Planner is to create an intelligent, adaptive, and user-friendly platform that helps students manage their study schedules efficiently. By leveraging artificial intelligence, the system will generate personalized study plans, track progress, and provide smart recommendations based on learning patterns.

The project aims to ensure efficiency, flexibility, and engagement by offering automated scheduling, task management, and real-time analytics. Using Agile methodologies, the development will follow an iterative approach, prioritizing user feedback, scalability, and seamless integration across devices. The ultimate goal is to enhance productivity, optimize learning time, and provide a structured yet adaptable study experience for students.

Key Points:

1. Technology Stack Used:

To ensure a seamless and efficient AI-powered study planner, the following technology stack has been selected for development:

1) Frontend:

- **Frameworks & Libraries:** React.js (for web), Flutter / React Native (for mobile)
- **Core Technologies:** HTML, CSS, JavaScript, TypeScript
- **UI Styling:** Tailwind CSS, Material-UI

2) Backend:

- **Frameworks & Libraries:** Node.js with Express.js
- **Languages:** TypeScript, JavaScript
- **Build Tools:** Vite for optimized development

3) AI & Machine Learning:

- **Libraries & Frameworks:** TensorFlow, PyTorch
- **Use Cases:** Adaptive learning models, recommendation systems for personalized study plans

2. Development Process:

The development process follows a structured approach to ensure seamless integration between the frontend and backend, making the AI Study Planner efficient and scalable.

1. Frontend Development Process

Tools & Technologies: React.js (Web), Flutter/React Native (Mobile), HTML, CSS, JavaScript, TypeScript

1. Project Setup:

- Initialize the frontend project using Vite for React.js or Flutter CLI for mobile.
- Configure package managers (npm/yarn).

2. UI/UX Design & Development:

- Design wireframes and prototypes for screens (Login, Dashboard, Study Planner).
- Develop responsive UI components using Material-UI, Tailwind CSS.

3. State Management & API Integration:

- Use React Context API / Redux for state management.
- Connect frontend with backend APIs (study planner, task management, authentication).

4. Testing & Debugging:

- Perform unit testing (Jest, React Testing Library).
- Debug UI interactions and API responses.

2. Backend Development Process

Tools & Technologies: Node.js, Express.js, TypeScript, PostgreSQL/MongoDB

1. Project Setup:

- Initialize backend with Node.js & Express.js.
- Set up TypeScript for better code management.

2. Authentication System:

- Implement Firebase Auth or OAuth 2.0 for user login/signup.
- Secure user sessions with JWT (JSON Web Tokens).

3. API Development:

- Create RESTful APIs for study plan generation, task management, and user progress tracking.
- Connect with PostgreSQL/MongoDB for data storage.

4. AI & Machine Learning Integration:

- Use TensorFlow/PyTorch for adaptive learning models.
- Deploy AI services and integrate them with APIs.

5. Testing & Debugging:

- Perform unit testing (Mocha, Jest) for API endpoints.
- Debug database queries and optimize performance.

3. Challenges & Fixes:

During the development of the AI Study Planner, several challenges were encountered, but effective solutions helped ensure smooth progress. Below are some key obstacles and their fixes:

1. Frontend Challenges & Fixes

- **Challenge:** UI responsiveness issues across different devices.
- **Fix:** Used CSS Flexbox/Grid, Material-UI, and media queries to ensure a fully responsive design.
- **Challenge:** State management complexity when handling study plans and user tasks.
- **Fix:** Implemented Redux Toolkit / React Context API to efficiently manage state and data flow.

2. Backend Challenges & Fixes

- **Challenge:** Authentication & security vulnerabilities.
- **Fix:** Implemented JWT authentication, OAuth 2.0, and data encryption to enhance security.
- **Challenge:** Database query inefficiencies leading to slow performance.
- **Fix:** Optimized queries using **indexed fields** in PostgreSQL/MongoDB and implemented **caching** with Redis.

Phase-6: Functional & Performance Testing

Objective:

The objective of the Functional & Performance Testing phase in the AI Study Planner project is to ensure that all system components work as intended and deliver optimal performance under various conditions. This phase focuses on validating the accuracy, efficiency, and reliability of the application before deployment.

Key Points:

1. Test Cases Executed:

Functional Testing:

- Authentication: User registration, login/logout, password reset.
- Study Plan & Tasks: Create, update, delete study plans; task reminders.
- AI Recommendations: Verify AI-generated study plans and adaptability.
- UI & Navigation: Check responsiveness, smooth navigation.

Performance Testing:

- Speed & Load: Measure page load times, API response times.
- Scalability & Stress: Test system stability under high traffic.
- Security: Verify unauthorized access prevention and data encryption.

2. Bug Fixes & Improvements:

- Authentication Fixes: Resolved login failures and improved password reset flow.
- UI/UX Enhancements: Fixed layout responsiveness and improved navigation.
- API Optimization: Reduced response time and fixed incorrect data retrieval.
- AI Model Tuning: Improved study plan accuracy based on user feedback.

3. Final Validation:

The AI Study Planner was thoroughly tested to ensure it aligns with the initial project requirements. Below is a validation summary

- Core Functionality: Successfully implemented study plan creation, task management, and AI-driven recommendations as per the project scope.
- User Experience: UI/UX optimized for responsiveness, ease of navigation, and accessibility across devices.
- AI Accuracy: AI models effectively provide personalized study plans based on user input and progress.
- Performance & Scalability: The system handles high user loads efficiently with optimized APIs and database queries.
- Security & Reliability: Strong authentication, data encryption, and API security measures ensure a safe user experience.

Final Submission:

Demo Video:

https://drive.google.com/file/d/14j91fPYN3KEvAOxh3rT_gqBjnb0y7D0z/view?usp=drive_link

GitHub/Code Repository Link: <https://github.com/Ramakrishnaghola/StudBud.git>

