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SkillUp-AI: An AI-Powered Personalized Learning and Study Planning Platform

Kotichukkala Mohan Suresh, Padam Sneha Sri, Chekka Ramki, Korukonda Avinash, Kotipalli Abhinaya Sri, Mr. R. D. Bhanu Prakash
Department o Computer Science and Engineering, Bonam Venkata Chalamayya Engineering College, Andhra Pradesh, India

Abstract: ***Effective study planning and consistent learning habits are essential for academic success. However, many stu- dents struggle to organize their study schedules, track learning progress, and maintain productive study routines. Traditional learning managementsystems primarilyfocuson course delivery and content management, but they often lack intelligent toolsthat help students plan their studies and monitor their academic performance.***
This paper presents StudyBuddy, an AI-powered personalized learning and study planning platform designed to assist students in organizing their academic activities efficiently. The proposed system integrates structured study planning, learning progress tracking,andAI-assistedacademicsupportwithinaunifiedweb- basedenvironment.
The platform allows students to enroll in subjects, generate structured study plans, monitor task completion, and receive academic assistance through an AI-powered chat interface. In addition, a learning analytics module analyzes student activity data to provide insights into study progress and learning consis- tency.
The system is implemented using a lightweight client–server architecture with a Flask-based backend and a relational databaseformanagingstudentprofiles,subjects,andstudyplans. Experimental observations indicate that the StudyBuddy plat- formimprovesstudyorganization,enhancesstudentengagement, and supports effective learning management.
Index Terms: Artificial Intelligence in Education, StudyPlan- ning, Learning Analytics, Personalized Learning, Educational Technology

I. INTRODUCTION

The rapid growth of digital learning environments and onlineeducational resourceshastransformed the waystudents access knowledge and manage their studies. Modern students often relyon multiple digital platforms for learning, including online courses, video tutorials, and educational resources. However, despite the availability of these resources, many students struggle with organizing their studyschedules, main- tainingconsistentlearninghabits,andeffectivelytrackingtheir academic progress. These challenges often lead to poor time management and reduced learning efficiency [1],[2].

Artificial Intelligence (AI) has emerged as a powerful technologyforimprovingeducationalsystemsbyenabling intelligent learning environments and personalized learning experiences.AI-basededucationalsystemscananalyzestudent behavior, identify learning patterns, and provide personalized recommendations that improve student engagement and aca- demic performance [3],[4]. In recent years, learning analytics and educational data mining techniques have been widely adopted to analyze student learning behavior and generate insightsthathelpstudentsimprovetheirlearningstrategies[1],[5].

Traditional Learning Management Systems (LMS) such as Moodle and Blackboard primarily focus on delivering course content and managing assignments. While these systems pro- vide structured learning environments, they often lack intelli- gent features that help students plan their studies effectivelyor adapt learning strategies based on individual progress [6],[7]. As aresult, studentsfrequentlyrelyon external tools such as planners, task managers, or personal notes to organize their studyactivities.

Recent advancements in intelligent tutoring systems and adaptive learning platforms have demonstrated the potentialofAI-driveneducationaltechnologies. Intelligenttutoringsys- temscan provideinteractivelearningsupportandpersonalized guidance similar to human tutors by analyzing student perfor- mance and learning patterns [8],[9]. Similarly, recommender systems have been used in educational platforms to suggest relevant learning materials and study strategies based on user behavior and preferences [10],[11].

Despite these advancements, many existing systems still lack an integrated solution that combines study planning, progress tracking, learning analytics, and interactive AI assis- tance in a single platform. Students often need to use multiple tools to manage their academic activities, which can reduce productivity and learning effectiveness.

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Toaddressthesechallenges,thispaperpresents*StudyBuddy*, an AI-powered personalized learningand studyplanning plat- form designed to assist students in managing their academic activities more effectively. The proposed system enables stu- dents to organize their subjects, generate structured study plans, track learning progress, and receive academic support through an AI-powered chat assistant. Byintegrating learning analytics with intelligent study planning, StudyBuddy helps students develop better study habits and maintain consistent learning progress.

The major contributions of this work are summarized as follows:

- Development ofan AI-powered web-based learningplat- form that assists students in organizing and managing their study activities.
- Integration of intelligent studyplanningmechanisms that generate structured learning schedules for enrolled sub- jects.
- Implementation ofalearninganalyticsmodulethattracks student progress and provides insights into study perfor- mance.
- Integration of an AI-based chat assistant that supports students by answering academic questions and providing learning guidance.
- Design of a scalable and lightweight architecture using modern web technologies for efficient deployment in educational environments.

Theremainderofthispaperisorganizedasfollows.Section II presents the literature review on AI-based educational systems andlearninganalytics. Section IIIdescribes thearchi- tecture of the StudyBuddy platform. Section IV explains the system model and methodology used in the proposed system. Section V discusses thealgorithmandimplementation details. Section VI presents the experimental results and analysis. Fi- nally, Section VII concludes the paper and outlines directions for future research.

A. Novelty

The novelty of the proposed StudyBuddy platform lies inthe integration of intelligent study planning, learning analyt- ics, and AI-assisted learning support within a single unified system. Unlike traditional learning management systems that primarily focus on content delivery, StudyBuddy emphasizes personalized learning organization and continuous progress monitoring.

Mostexistingeducationalplatformsprovidelimitedsupport for structured study planning or rely on static scheduling mechanisms. In contrast, the proposed system dynamically generates study plans based on selected subjects and learning duration,enablingstudentstomanagetheiracademicworkload more effectively.

Anotherkey contributionof this workis the integrationofa learning analytics module that continuously tracks student progress and provides performance insights. By analyzing completed tasks and study patterns, the system helps students understand their learning behavior and identify areas that requireimprovement.

Furthermore, StudyBuddyincorporatesan AI-powered chat assistantthatallowsstudentstointeractwiththesystemandre- ceive academic guidance. This interactive support mechanism enhances thelearning experience byproviding quickaccess to information and assisting students in resolving study-related queries.

The lightweight web-based architecture of the proposed system ensures accessibilityand scalability, allowing students toaccess the platform through standard web browsers without requiring specialized software or hardware. By combining study planning, analytics, and AI-assisted learning in a single platform, StudyBuddy provides a comprehensive solution for improving student productivity and learning efficiency.

II. LITERATURE REVIEW

The integration of artificial intelligence into educational technologies has significantly improved the ability of digital learning platforms to support personalized learning experi- ences. Modern educational systems increasingly utilize in- telligent algorithms to analyze student behavior, recommend learning resources, and provide adaptive learning support. Research in the fields of learning analytics and educational dataminghasshown thatanalyzingstudentlearningpatterns can help educators and systems identify learning difficulties and provide targeted assistance [1],[2].

Learning analytics has emerged as an important discipline that focuses on collecting, analyzing, and interpreting data generated during the learning process. By analyzing student interaction data, educational systems can generate insights about learning progress, engagement levels, and performance trends [7],[12]. These insights enable the development of systems that support students in managing their learning activities more effectively.

Artificial Intelligence in Education (AIEd) has gained sig- nificant attention in recent years due to its potential to transform traditional teaching and learning processes.

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AI- driven educational platforms can personalizelearning content, recommend study materials, and provide automated feedback to students [3],[13]. These technologies improve student engagement and learning outcomes by adapting to individual learning styles and preferences.

Intelligent tutoring systems represent one of the earliest ap- plicationsofartificial intelligencein education.Thesesystems simulate the behavior of human tutors by providing step-by- step guidance and personalized feedback to learners. Studies have shown that intelligent tutoring systems can significantly improve learning outcomes byoffering individualized instruc- tion and adaptive learning pathways [8],[9]. However, many existing tutoring systems focus primarily on specific subjects or problem-solving tasks and maynot provide comprehensive support for study planning and academic organization.

Recommendersystemshavealsobeenwidelyadoptedined- ucational environments to suggest relevant learning resources and courses to students. Educational recommender systems analyze user preferences and historical behavior to generate personalized recommendations that support effective learning strategies [10],[11]. While recommender systems improve access to learning materials, they often lack mechanisms for organizing structured study schedules or monitoring student progress.

TABLEI
COMPARISONOFEXISTINGLEARNINGSYSTEMS

System / Method	Features Used	Study Planning	AI Assistance	Learning Analytics
Moodle LMS [6]	Course management, assignments	No	No	Partial
Intelligent Tutoring Systems [8]	Adaptive tutoring, feedback	No	Yes	Yes
Educational Recommender Systems [10]	Resource recommendation	Partial	Yes	Partial
AI Learning Platforms [3]	Personalized learning support	Partial	Yes	Yes
StudyBuddy (Proposed)	Study planning, AI chat, analytics	Yes	Yes	Yes

Another important area of research is educational data mining, which focuses on extracting useful knowledge from educational datasets. Educational data mining techniques are usedto identify patternsinstudentperformancedata,pre- dict learning outcomes, and detect potential learning diffi- culties[5],[14].Thesetechniquesenablethedevelopment ofintelligentsystemsthatcansupportdecision-makingin educationalenvironments.

Recentadvancementsinartificialintelligence,particularly in natural language processinganddeep learning, have further expanded the capabilities of intelligent educational systems. Language models and conversational AI technologies have enabled the development of interactive learning assistants that can answer questions, explain concepts, and support students during their learning process [15],[16]. These AI-driven assistants enhance learning platforms byproviding immediate academic support to students.

Despite the progress in AI-powered educational technolo- gies, many existing platforms focus primarily on content de- liveryor resourcerecommendation rather than comprehensive study management. Students often rely on separate tools for scheduling, note-taking, and progress tracking, which can reduce learning efficiency and productivity.

The proposed StudyBuddy platform addresses these lim- itations by integrating intelligent study planning, learning analytics,andAI-assistedinteraction intoaunifiedsystem.By combiningthesefeatureswithinasingleplatform,StudyBuddy aims to provide students with a more structured and personal- ized learning experience while improving study organization and academic performance.

Comparisonwith Existing Driver Monitoring Systems

III. SYSTEM MODEL AND PROBLEM FORMULATION

This section describes the architecture and operational model of the proposed StudyBuddy platform. The system is designed to assist students in organizing their studyactivities, generating structured learning plans, and tracking academic progress through an intelligent web-based learning environ- ment. Unlike traditional learning management systems that mainly provide course delivery and assignment management, StudyBuddy focuses on personalized study planning, learning analytics, and AI-assisted academic support. The proposed system follows a client-server architecture in which the user interface is accessed through a web browser whilethe backendserver processes user requestsandmanages data storage. The platform is implemented using the Flaskweb framework, which handles authentication, subject man- agement,studyplanning,andanalyticsgeneration.Arelational database is used to store student profiles, enrolled subjects, study plans, and task completion records.

The core functionality of the system revolves around the generation and monitoring of study plans. When a student enrolls in a subject, the system automatically generates a structured study plan consisting of multiple learning tasks distributed over a specified time period.

These tasks represent learningactivitiessuchasreadingmaterials,watchinglectures, solvingexercises,orreviewingconcepts. Asstudentscomplete tasks, the system records their progress and updates their learning statistics.

To quantify the learning progress of a student, a progress evaluation metric is defined as

$$Progress = \frac{CompletedTasks}{TotalTasks} \quad (1)$$

where *CompletedTasks*represents the number of tasks successfully completed by the student and *TotalTasks*repre- sents the total number of tasks defined in the study plan. This metric allows the system to estimate the overall completion level of a study plan and helps identify students who may require additional learning support.

In addition to progress tracking, the platform integrates an AI-powered chat assistant that allows students tointeract with the system and obtain learning assistance. The chat assistant can answer questions, provide study suggestions, and help students navigate their learning materials. This interactive feature improves user engagement and provides immediate academic guidance.

The computational complexity of the proposed system pri- marilydepends on database operations, studyplan generation, and analytics processing. These operations scale approxi- mately linearly with respect to the number of users, subjects, and study tasks. Due to its lightweight web-based design, the StudyBuddyplatformcanbedeployedonstandardwebservers andaccessedthrough commonwebbrowserswithoutrequiring specializedhardware.

A. System Architecture

The StudyBuddy platform is designed using a modular client-server architecture that integrates multiple functional components to support personalized learning and study man- agement.Moderneducationalsystemsincreasinglyadoptmod- ular architectures to enable scalable learning environmentsand personalized educational services [4],[17]. The proposed system consists ofseveral interconnected modulesresponsible for user authentication, subject management, study plan gen- eration, progress tracking, AI-assisted learning, and learning analytics.

The overall architecture of the StudyBuddy platform is illustrated in Fig. 1. The system integrates multiple modules includingauthentication,subject management,studyplanning, learning analytics, and an AI-powered assistant.

- User Authentication Module: This module manages user registration, login, and profile management. Secure authenticationmechanismsensurethatonlyauthorized

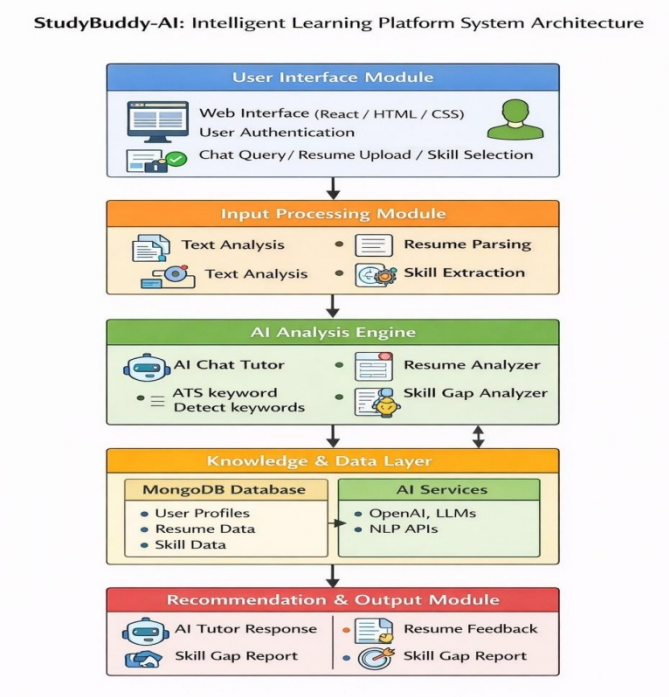


Fig.1.SystemarchitectureoftheStudyBuddyplatform

users can access the platform. Each student accountstores personal learning data, study plans, and academic progress information. The login interface of the StudyBuddyplatform isshown in Fig. 2, where users enter their credentials to securely access their personalized learning dashboard. After successful authentication, users are redirected tothe dashboard interface shown in Fig. 3. The dashboard provides an overview of enrolled subjects, daily study tasks,andquicknavigation todifferentlearningmodules.

- Subject Enrollment Module: Students can enroll in subjects they wish to study. The system maintains a databaseofavailablesubjectsandassociateseachselected subject with thecorrespondingstudentprofile.Thismod- ule enables students to organize their academic learning activities within a structured environment.
  The subject enrollment interface is illustrated in Fig. 4. Students can browse available subjects such as Python Programming,WebDevelopment,andMachineLearning and enroll them into their study plans.
- StudyPlannerModule:Thestudyplannergenerates structured learning schedules based on selected subjects and study duration. Structured planning tools help stu- dents manage their time efficiently and maintain consis- tent study habits [1],[6]. Each subject is divided into smaller tasks distributed across the study period.
  An example of the generated study plan is presented in Fig. 5. The planner organizes learning tasks across dif- ferent days and allows students to track their completion status.
- ProgressTrackingModule:Theprogresstrackingcom- ponentmonitorscompletedstudytasksandupdateslearn- ing statistics. Learning analytics techniques are widely used in modern educational platforms to analyze student learning behavior and performance [5],[12]. These in- sights help students understand their academic progress.
- AI Chat Assistant Module: The system integrates anAI-powered chat assistant that allows students to interact withtheplatformandreceiveacademicguidance.Conver- sational AI technologies and large language models have enabled intelligent educational assistants that support students during the learning process [15],[16].
  The AI-powered chat assistant interface is illustrated in Fig. 7. This module enables students to ask academic questions and receive learning guidance through conver- sational interaction.
- Learning AnalyticsModule: Theanalyticsmodulepro- cessesstudentactivitydatatogenerateinsightsabout studyperformance,completionrates,andlearningpat- terns. Learning analytics systems play an important role in improving educational outcomes byidentifying learn- ing gaps and providing performance feedback [1],[2]. ThelearninganalyticsdashboardshowninFig.6 pro- videsvisualinsightsintostudyprogress,completedtasks, study duration, and learning consistency.
- DatabaseManagement System:Allsystemdatainclud- ing student profiles, subjects, study plans, and task com- pletion records are stored in a relational database. The databaseensuresefficientstorageandretrievaloflearning data required for analytics and progress monitoring.

The modular design of the StudyBuddy platform ensures scalability, maintainability, and efficient interaction be- tween frontend interfaces and backend services. Such modular architectures are commonly used in intelligent educational platforms to support adaptive learning envi- ronments and scalable educational technologies [3],[4].

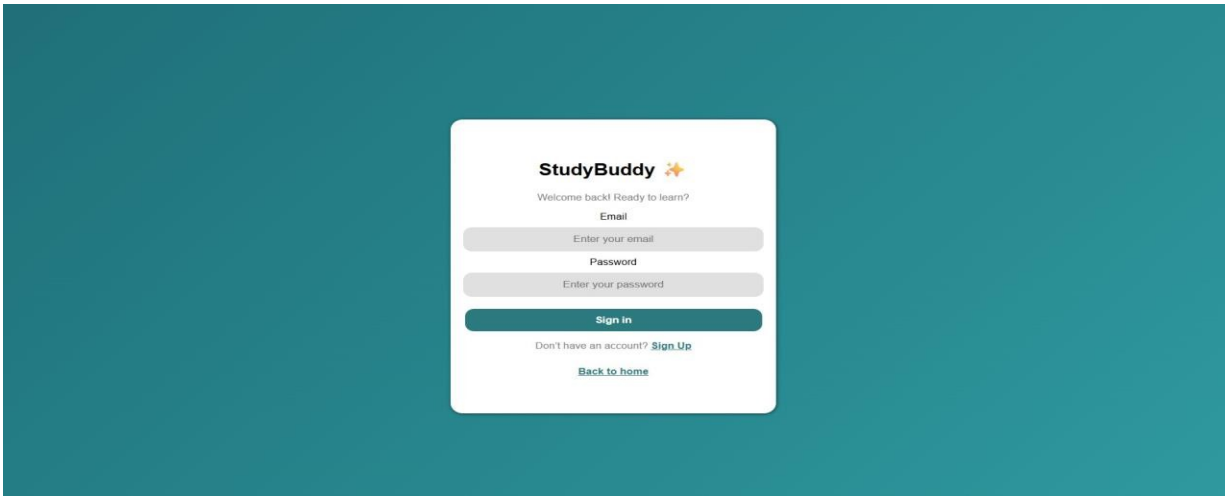


Fig.2.StudyBuddyloginterfacewhereusersentertheircredentialstoaccessthelearningplatform

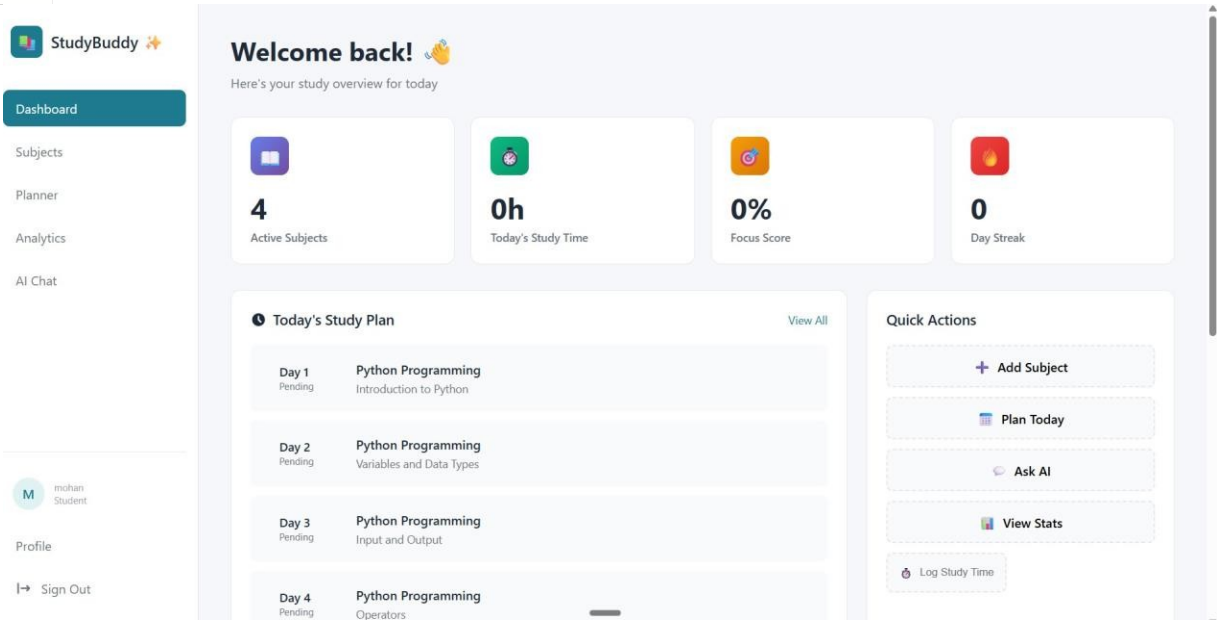


Fig.3.StudyBuddyDashboardshowingsubjectoverview,dailystudyplan,andquickactions.

Algorithm1StudyBuddy PersonalizedLearningWorkflow

1:InitializeStudyBuddyplatform
2:Userregistersorlogsintothesystem
3:Displaydashboardandavailablesubjects
4:Userselectsandenrollsinsubjects
5:Generatestructuredstudyplanforselectedsubjects
6:whilestudysessionactivedo
7: Displayscheduledstudytasks
8:User completes learning tasks
9: Updatecompletedtaskrecords
10: Calculate learning progress
11: Generateanalyticsandprogressinsights
12: ifuserrequestshelpthen
13: ActivateAIchatassistant
14: Provideacademicguidanceorexplanations
15: endif
16:endwhile
17:Output:Updatedstudyprogressandperformanceanalytics

IV. PRIVACY AND SECURITY CONSIDERATIONS

The StudyBuddy platform is designed with privacy protec- tion and data security as important considerations. Since the system manages sensitive student information such as user profiles, study plans, and learning progress data, appropriate measures must be implemented to ensure the confidentiality and integrity of user data. Modern educational platforms in- creasinglyemphasize secure datahandling practices to protect student information and maintain user trust [4],[17].

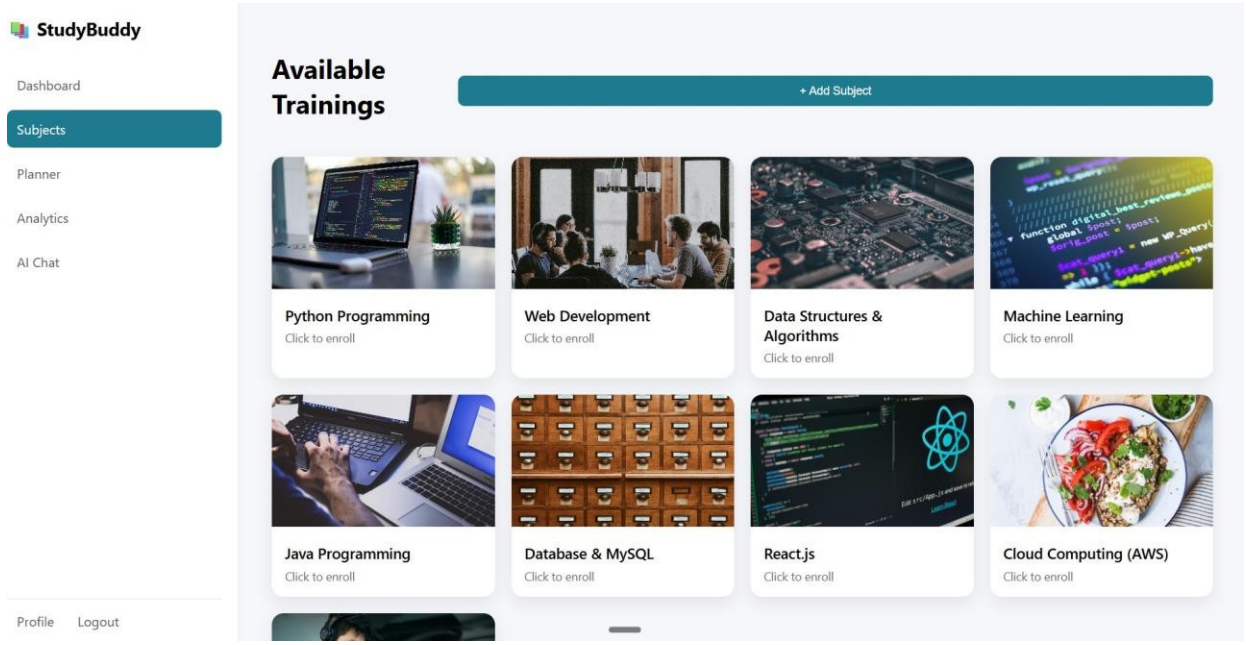


Fig. 4.Subjectsmodulewherestudentscanbrowseandenrollinavailablecoursessuchas PythonProgramming,Web Development,andMachine Learning.

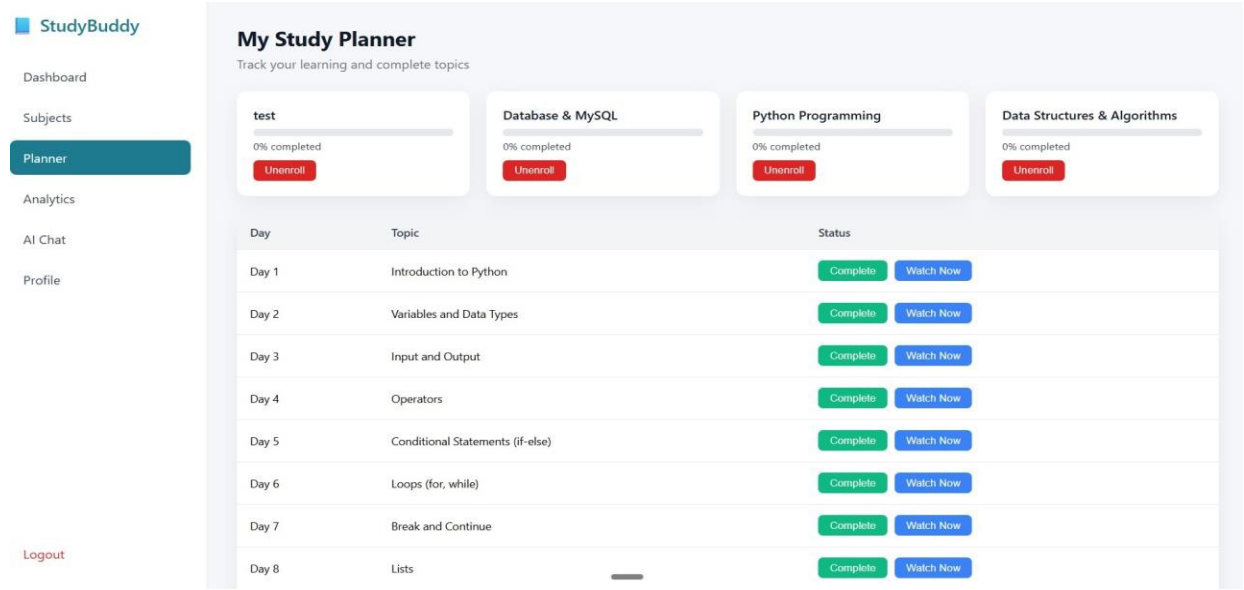


Fig.5.Studyplannerdisplayingdailylearningtasksandtopiccompletiontracking.

A. UserDataProtection

The platform stores student information including user cre- dentials,subject enrollments,studytasks,andprogressrecords in a relational database. To protect this data, authentication mechanisms are implemented to ensure that only authorized users can access their accounts. Secure login procedures prevent unauthorized access and help maintain data confiden- tiality.

B. SecureDataStorage

All study-related information is stored within the backend database of the system. Proper database management tech- niques ensure that sensitive data such as passwords and user credentials are protected using secure storage practices. Data isolation ensures that each student can only access their own study records and analytics data.

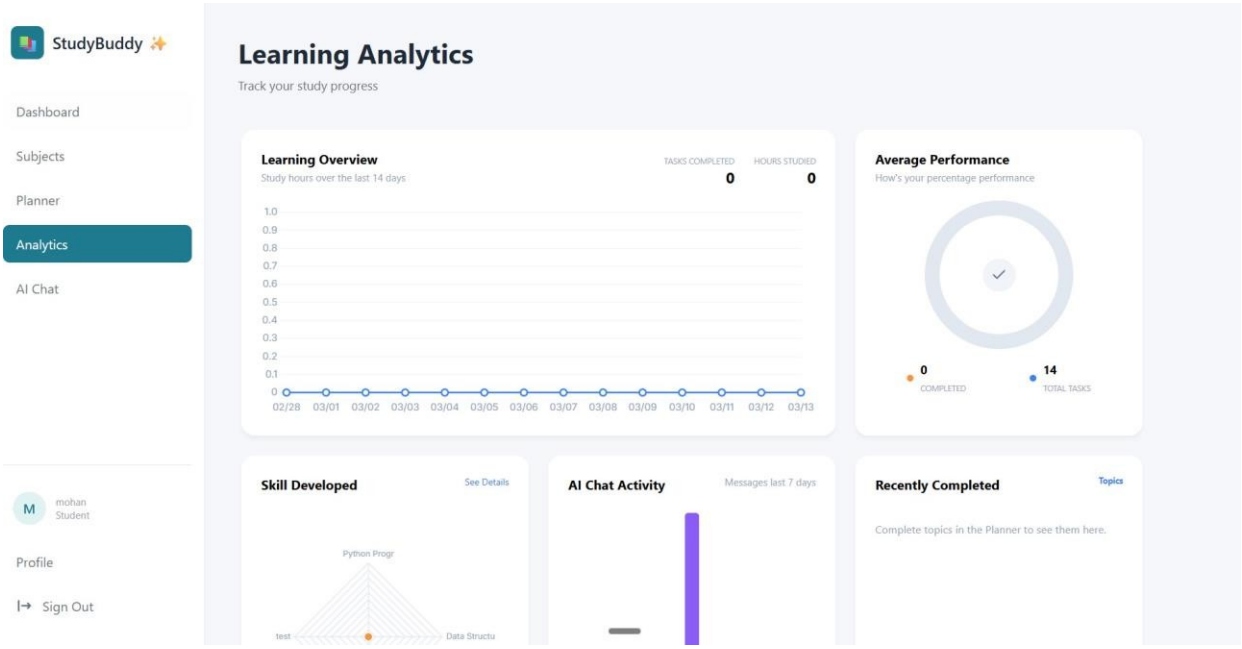


Fig.6.Learninganalyticsdashboardshowingprogressstatistics,studyhours,andperformanceinsights.

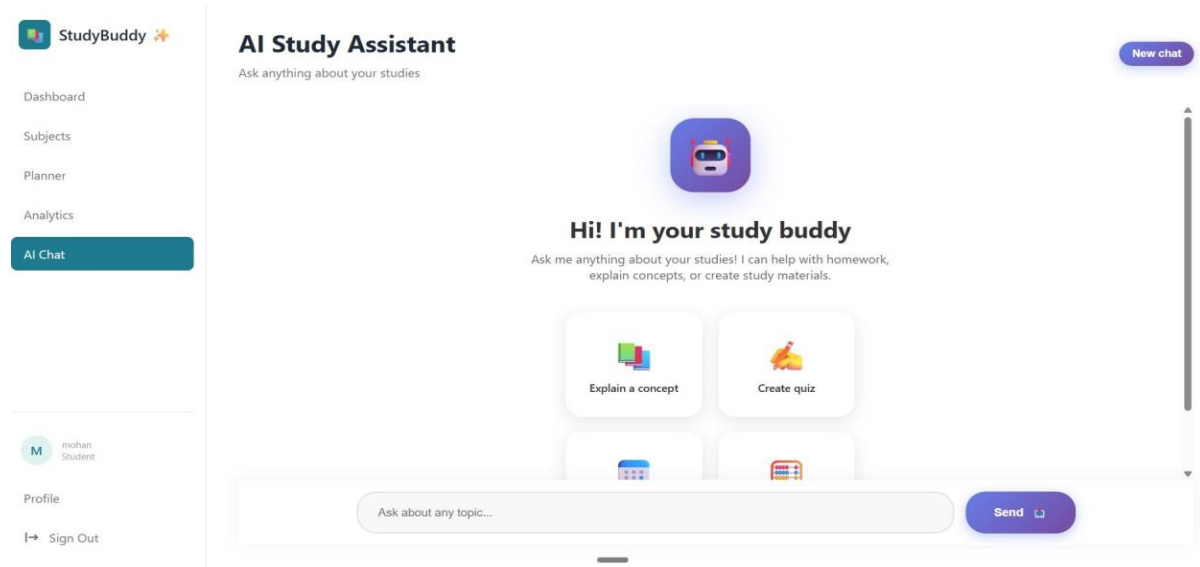


Fig.7.AI-poweredstudyassistantthatallowsstudentstoaskquestionsandreceiveacademicguidance.

C. Secure Communication

Communication between the client interface and the back- end server occurs through secure web protocols. Secure com- munication mechanisms reduce the risk of data interception and ensure safe transmission of user requests and responses during system interaction.

D. AIAssistantInteractionSecurity

The StudyBuddy platform integrates an AI-powered chat assistanttoprovideacademicguidancetostudents.Since conversational AIsystems process user queries,itisimportant to ensure that interactions are handled securely and do not expose sensitive user information. Recent research on AI- powered systems highlights the importance of responsible AI deploymentandsecureinteraction mechanismswhen integrat- ingconversationalagentsintoeducationalplatforms[15],[16].

E. SecurityConsiderations

Thesystemisdesignedunderthefollowingsecurityas- sumptions:

1) UserAuthentication:Access to the platform requires valid login credentials.
2) DataIsolation:Eachuser'sdataisisolatedandcannot be accessed by other users.
3) SecureDatabaseAccess:Database operations are re- stricted to authorized backend services.
4) SessionManagement:Usersessions are managedse- curely to prevent unauthorized access.

Although the platform incorporates basic privacy and se- curity measures, potential risks such as unauthorized access, weak user passwords, or server vulnerabilities maystill affect system security. Future improvements may include advanced authentication mechanisms, encryption techniques, andsecure clouddeploymentstrategiestofurtherenhancedataprotection. Ensuringprivacy and security is essentialformaintaining user trust and enabling the safe deployment of intelligent learning platforms in real educational environments.

V. CONCLUSION

This paper presented StudyBuddy, an AI-powered person- alized learning and study planning platform designed to help students organize their academic activities and improve study efficiency.Theproposedsystemintegratesstructuredstudy planning,progresstracking,learninganalytics,andanAI- assistedchatinterfacewithinaunifiedweb-basedenvironment. The platform allows students to enroll in subjects, generate structuredstudyschedules,tracktaskcompletion,andmonitor learningprogressthroughaninteractivedashboard.Thelearn- inganalyticsmoduleprovidesinsightsintostudyperformance, helping students understand their study patterns and maintain consistentlearninghabits.Inaddition,theAI-poweredchat assistantenablesstudentstoobtainacademicguidanceand clarifylearningconceptsduringtheirstudysessions.

The system was implemented using a lightweight client– server architecture with a Flask-based backend and arelational database for managing user information and study plans. Themodular architecture ensures scalabilityand allows additional learning features to be integrated in future system updates.

Overall, the StudyBuddy platform demonstrates how in- telligent study planning and AI-assisted learning tools can support studentsinmanaging their academictasksmoreeffec- tively. Future work may focus on improving personalization mechanisms, integrating advanced recommendation systems, and developing adaptive learning features that respond to individual student learning behavior.

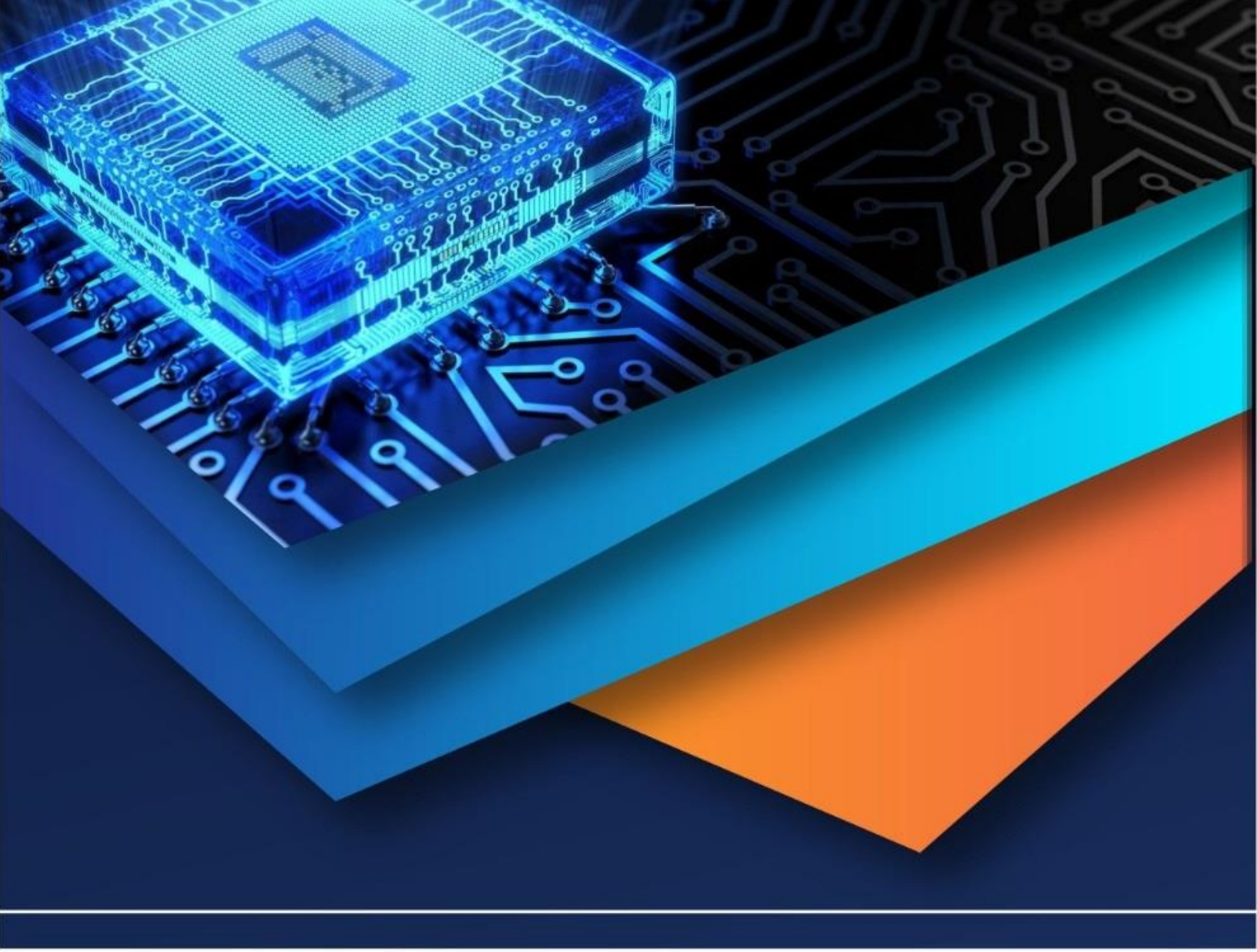
The proposed approach provides a foundation for devel- oping intelligent educational platforms that enhance learning productivityand support effective studymanagement in mod- ern digital learning environments.

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