STUDENT ACHIEVEMENTS TRACKING PORTAL

PROJECT REPORT

Submitted by

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In partial fulfilment for the award of the degree of

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BONAFIDE CERTIFICATE

Certified that this project report "**Student Achievements Tracking Portal**" is the bonafide work of **"HARDEEP M (7376212IT143), CHARANKUMAR S K (7376212IT115), HAYMON R S (7376212IT151)"** who carried out the project work under mysupervision.

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We affirm that the project work titled **"Student Achievements Tracking Portal."** being submitted in partial fulfillment for the award of the degree of **Bachelor of Information Technology** is the record of original work done by us under the guidance of **Dr Padmashree A**, Associate Professor, Department of Computer Science and Business Systems. It has not formed a part of any other project work(s) submitted for the award of any degree or diploma, either in this or any other University.

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ABSTRACT

The use of web-based technologies, particularly React.js for the frontend, Golang for the backend, and MySQL for data management, offers significant advancements in student achievement tracking by automating and enhancing academic performance monitoring. Educational institutions often struggle with managing student records, tracking progress, and generating insightful reports, which traditionally require extensive manual effort. However, a centralized digital system can streamline these processes by providing real-time insights, structured data storage, and secure access control.

The Student Achievement Tracking Portal, built with React.js, Golang, and MySQL, efficiently manages academic records, extracurricular activities, and attendance. The system's role-based access control ensures that administrators, teachers, students, and parents can securely interact with relevant data. The platform's data visualization capabilities, including interactive charts and automated reports, help identify performance trends and areas requiring attention. By integrating modern web technologies, this solution enhances transparency, efficiency, and decision-making, making it an essential tool for educational institutions.

Keywords: React.js, Golang, MySQL, Student Progress Tracking, Data Analytics, Role-Based Access, Educational Portal

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LIST OF ABBREVIATIONS

Words	Abbreviations
DB	Database
ER	Entity Relationship
SQL	Structured Query Language
SATS	Student Achievements Tracking System
RJS	React JS
NJS	Node JS
ERD	Entity Relationship Diagram
API	Application Programming Interface
UI	User Interface

CHAPTER 1

1. STUDENT ACHIEVEMENTS TRACKING

Monitoring and tracking student achievements is a crucial aspect of educational institutions to evaluate academic and extracurricular progress. Traditional methods of tracking student accomplishments rely on manual record-keeping, which is often inefficient, prone to errors, and lacks real-time accessibility. With advancements in web-based technologies, automated digital systems provide structured, secure, and real-time tracking of student achievements, ensuring transparency and accuracy in performance evaluation.

The Student Achievement Tracking Portal is a comprehensive digital platform that leverages React.js for the frontend, Golang for the backend, and MySQL for database management to efficiently store and process student data. The system offers role-based access control, allowing students to upload achievements, administrators to verify and approve records, teachers to monitor progress, and parents to receive notifications. The platform supports academic records, co-curricular activities, competitions, and project tracking, enabling a holistic evaluation of student performance.

Traditional student record management systems have several limitations, including data loss, lack of accessibility, and difficulty in retrieving records. Institutions often struggle with organizing large volumes of student achievements, making it challenging to analyze trends or generate performance reports. A centralized system like the Student Achievement Tracking Portal eliminates these challenges by providing a user-friendly dashboard, automated analytics, and seamless communication between stakeholders. Various data management approaches, such as spreadsheet-based tracking and offline documentation, have been used for maintaining student records. However, these approaches require manual effort, are prone to inconsistencies, and do not support dynamic data visualization. With the growing need for real-time data processing and automated analysis, institutions require a cost-effective and scalable solution that ensures accuracy and efficiency.

Recent advancements in data analytics, cloud computing, and machine learning have revolutionized student progress tracking by enabling predictive analysis and

performance insights. The integration of React.js, Golang, and MySQL ensures a scalable, high-performance, and secure system, offering real-time updates and automated report generation. Additionally, the platform incorporates interactive dashboards, notifications, and role-based access, ensuring efficient data management and collaboration between students, teachers, administrators, and parents.

Web-based portals have significantly improved the efficiency of academic record management, eliminating the manual dependency and ensuring seamless accessibility. With the use of RESTful APIs, cloud storage, and secure authentication mechanisms, the Student Achievement Tracking Portal provides a robust and dynamic solution for institutions seeking a streamlined approach to student record management. The system also supports integration with existing educational platforms and can be expanded with additional features such as AI-based performance predictions, attendance tracking, and progress analysis.

By leveraging modern web technologies, the portal enhances transparency, reduces administrative burden, and provides stakeholders with meaningful insights into student achievements. With an intuitive interface, automated functionalities, and real-time tracking, the Student Achievement Tracking Portal is a transformative solution that optimizes student progress monitoring, ensures data integrity, and facilitates informed decision-making in educational institutions.

Furthermore, the Student Achievement Tracking Portal supports multi-device accessibility, allowing users to access the system from desktops, tablets, and mobile devices. The platform ensures data privacy and security through role-based authentication, encrypted storage, and secure APIs, preventing unauthorized access to student records.

To enhance user engagement, the system integrates real-time notifications via email and SMS, ensuring that students, teachers, and parents are promptly informed about achievement approvals, pending verifications, or any updates related to student progress. Additionally, automated report generation simplifies the process of compiling student records for institutional audits, parent-teacher meetings, and academic evaluations.

The modular architecture of the portal allows for future scalability, enabling institutions to integrate features such as AI-based academic recommendations, personalized learning insights, and predictive performance analysis. The platform can also be extended to support multiple institutions, making it adaptable for large-scale educational organizations.

By digitizing student achievement tracking, the portal reduces paperwork, minimizes errors, and improves administrative efficiency, ultimately enhancing the overall educational experience. Institutions can leverage this system to streamline student record management, ensure accuracy in evaluations, and foster a data-driven academic environment.

1.1. Challenges in traditional student record management

Traditional student record management systems, which primarily rely on paper-based documentation or outdated digital solutions, pose significant challenges for educational institutions. The manual handling of student records is time-consuming and error-prone, leading to inefficiencies in maintaining accurate and up-to-date information. The process of tracking student achievements, including academic, extracurricular, and co-curricular accomplishments, becomes cumbersome due to the lack of a centralized system. Paper records can be misplaced or damaged over time, making it difficult to retrieve historical data when needed. Additionally, physical storage requirements add to the administrative burden, increasing operational costs for schools and universities.

One of the major drawbacks of traditional record management is the lack of real-time access to information. Teachers, students, and parents often have to wait for updates, causing delays in decision-making and communication. This gap in accessibility leads to inefficiencies in student progress tracking, as achievements are not recorded promptly, and errors in manual data entry further complicate the process. Moreover, traditional systems often require significant manpower for data management, leading to increased workload for administrative staff. This results in difficulties in verifying and validating student achievements, which can impact scholarship applications, higher education admissions, and

job placements.

Security and data integrity are also significant concerns in traditional student record management. Paper-based records are vulnerable to unauthorized access, forgery, and manipulation. Without proper access controls, sensitive student information may be misused or lost. In addition, compliance with data protection regulations becomes challenging, as institutions struggle to implement secure storage and retrieval mechanisms. Digital records stored in outdated or fragmented systems are also at risk of data loss due to system failures, lack of backups, or cyber threats.

Furthermore, the scalability of traditional record management systems is limited. As educational institutions grow and the number of students increases, managing records manually becomes unsustainable. The process of retrieving past achievements or generating reports for a large student base is inefficient, leading to bottlenecks in administrative workflows. Institutions also face difficulties in integrating traditional systems with modern educational technologies, such as online learning platforms, student portals, and communication tools, which restricts the overall efficiency of student progress tracking.

To address these challenges, a modern, automated student achievement tracking system is necessary. By implementing a digital platform, institutions can streamline the process of recording, managing, and verifying student achievements, ensuring accuracy, security, and real-time access to data.

1.2. Importance of Tracking Student Achievements

Tracking student achievements plays a crucial role in educational institutions by providing a structured approach to monitoring academic and extracurricular progress. A well-organized tracking system allows educators to assess student performance holistically, identifying strengths and areas that require improvement. When achievements are systematically recorded, institutions can provide personalized learning experiences, ensuring that students receive the necessary support and guidance to excel in their respective fields. Additionally, tracking achievements fosters a culture of motivation and self-improvement, as students can visualize their progress over time and set realistic goals for their academic and personal growth.

A robust student achievement tracking system also enhances transparency and accountability within educational institutions. By maintaining a centralized database of student accomplishments, teachers, administrators, and parents can access real-time insights into student progress. This enables timely interventions and better decision-making regarding curriculum planning, career guidance, and skill development programs. Schools and universities can also use achievement records to identify high-performing students for scholarships, awards, and leadership opportunities, recognizing their efforts and encouraging a competitive yet supportive learning environment.

Moreover, tracking student achievements is essential for higher education admissions and career advancement. Universities and employers often seek candidates with a proven track record of excellence in academics, extracurricular activities, and community involvement. A well-documented history of student achievements strengthens applications for scholarships, internships, and job opportunities, giving students a competitive edge. Furthermore, institutions that effectively track and showcase student accomplishments build a strong reputation, attracting prospective students and enhancing their credibility in the academic community.

In addition, an efficient student achievement tracking system promotes data-driven decision-making. Educational institutions can analyze trends in student performance, identify learning gaps, and implement targeted interventions to improve overall academic outcomes. By leveraging digital solutions for tracking achievements, institutions can automate reporting processes, reduce administrative workload, and ensure accuracy in maintaining student records. Ultimately, a systematic approach to tracking student achievements benefits all stakeholders, fostering academic excellence, career readiness, and institutional growth.

1.3. Objective And Scope of The Project

The primary goal of this project is to create an automated Student Achievement Tracking Portal that serves as a centralized system for monitoring and assessing student accomplishments across academic, technical, and extracurricular domains. This system ensures real-time tracking, unbiased evaluation, and transparency, supporting institutions

in making informed decisions about student progress and placement opportunities.
The key objectives of this system are:

- **Automated Achievement Tracking**:

The portal will systematically collect, analyze, and update student achievements, including academic records, certifications, projects, internships, research contributions, and extracurricular activities.

- **Objective and Fair Evaluation**:

By leveraging data-driven insights, the system eliminates manual bias in student assessments, ensuring that achievements are evaluated based on predefined and standardized metrics.

- **Centralized Performance Dashboard**:

A unified platform will be available for students, faculty, and administrators to access verified academic and non-academic accomplishments, track individual progress, and compare performance metrics.

- **Skill-Based Filtering and Recognition**:

Institutions and recruiters can filter student profiles based on specific skills and achievements, such as participation in hackathons, industry-recognized certifications, leadership roles, and technical project contributions.

- **Real-Time Updates and Automated Verification**:

The system will dynamically update student records with automated verification mechanisms, ensuring authenticity, accuracy, and relevance to academic and industry standards.

By implementing these objectives, the Student Achievement Tracking Portal promotes efficiency, fairness, and transparency in recognizing student success. It encourages students to document their progress systematically, assisting institutions in data-driven decision-

making for academic purposes.

This project serves as a comprehensive solution for tracking student performance by integrating real-time analytics and automated monitoring. By maintaining structured achievement records, the portal helps institutions provide personalized guidance and recognition while ensuring that academic evaluations and placements emphasize practical skills and real-world accomplishments. As technology continues to evolve, real-time tracking of student achievements will play a vital role in bridging the gap between academic learning and industry expectations, preparing students for successful careers.

CHAPTER 2

LITERATURE SURVEY

Traditional student performance assessment has primarily relied on academic grades, teacher evaluations, and standardized test scores. However, as education evolves to emphasize holistic development, there is a growing need to track a broader range of student achievements, including extracurricular activities, project work, research contributions, and leadership roles. The integration of digital platforms has further expanded the scope of student assessment, enabling institutions to gather and analyze real-time data on student progress. Researchers have explored various data-driven models for tracking achievements, automating evaluations, and providing personalized feedback to students.

Several studies have highlighted the challenges associated with manual student record management, including inefficiencies, data inconsistency, and limited accessibility. To address these issues, institutions are adopting automated tracking systems that provide a centralized platform for recording and analyzing student accomplishments. Such systems leverage modern technologies like cloud computing, artificial intelligence, and data analytics to streamline achievement tracking and generate insightful performance reports.

Chitoor Venkat Ajay Kumar et al. (2024) had proposed an automated student evaluation and analysis system to address the inefficiencies in traditional student performance assessment. The existing manual evaluation methods were time-consuming, error-prone, and lacked real-time feedback, leading to decreased student engagement and motivation. Various methodologies, including machine learning and educational data mining, have been developed to predict student achievement. However, these methods primarily focus on academic performance and do not consider non-academic activities, personality traits, and other technical or non-technical skills. The study emphasized the need for a system that can efficiently evaluate student performance by analyzing large datasets from multiple sources, including exam results and extracurricular achievements. The proposed system aimed to provide detailed insights into students' strengths and

weaknesses while enabling teachers to track progress, identify improvement areas, and offer personalized feedback. The challenge of implementing such a system lies in processing vast amounts of data, recognizing patterns, and delivering meaningful real-time insights. The study highlighted the necessity of integrating artificial intelligence, machine learning techniques, and user-friendly visualization tools to enhance student evaluation and academic decision-making [1].

Jorge Maldonado-Mahauad et al. (2024) had developed MoTE, a real-time monitoring tool designed to assess student engagement in both face-to-face and online learning environments. The study addresses the limitations of traditional engagement measurement methods such as self-reports, interviews, and eye-tracking tools, which fail to capture a multidimensional engagement approach encompassing cognitive, affective, and behavioral aspects. Using a Design-Based Research methodology, the authors identified key engagement indicators and developed visualizations tailored to meet the needs of educators and students. The study further presents the architecture and implementation of an initial MoTE prototype, which was evaluated with 146 students across various learning contexts. The findings provide insights into the effectiveness of the tool's dashboards, indicators, and functionalities in enhancing student engagement tracking. This research not only introduces an innovative approach to measuring student engagement but also lays the foundation for future advancements in real-time educational analytics and engagement assessment technologies [2].

R. Lavanya et al. (2024) developed a Comprehensive Student Monitoring Solution, an integrated system aimed at enhancing attendance tracking, drowsiness detection, and proctoring functionalities in educational environments. This system leverages advanced technologies to provide real-time monitoring and analysis of student activities, ensuring a secure and engaging learning experience [3]. The solution features seamless attendance tracking, enabling educators to efficiently manage student records. Additionally, the incorporation of drowsiness detection technology helps identify signs of fatigue or disengagement, allowing instructors to take timely action. The system also includes an advanced proctoring mechanism that facilitates remote supervision of exams and assessments, ensuring academic integrity by preventing

dishonest practices. With a user-friendly interface and robust functionalities, this monitoring solution offers a significant advancement in student engagement and academic performance management, making it a valuable asset for educational institutions.

Naim Dahnoun (2024) explored the challenges faced by modern teaching platforms in remote and in-person education, emphasizing the need for real-time feedback to enhance engagement and interactivity. To address these issues, a real-time feedback system was proposed, integrating a graphical user interface (GUI) that allows students to provide immediate input while attending videoconference sessions. The collected feedback is processed and displayed on the teacher's GUI, enabling instructors to make real-time adjustments without interrupting the session. By decoupling the video stream from feedback processing, computational efficiency is maintained, ensuring smooth functionality across various videoconferencing platforms [4]. The system offers additional features such as real-time voting, automatic video-to-slide conversion, lecture speed control, and annotation management, all while operating on a low-cost server with minimal impact on primary platforms like Zoom and Teams. This solution enhances communication between students and educators, fostering a more interactive and effective learning environment.

Deborah Ebem et.al (2024) conducted a study on the implementation of deep learning techniques for evaluating student performance and achievement tracking. Their research introduced an AI-driven model that integrates real-time data from academic records, coding platforms, and project contributions to assess student competencies beyond traditional grading systems. The model employed advanced machine learning algorithms to analyze various performance indicators. The system provided real-time insights, allowing students and educators to track progress, identify strengths and weaknesses, and make informed decisions [5]. The authors argue that their study highlights the importance of AI in educational assessment, demonstrating its potential to enhance fairness, accuracy, and efficiency in student achievement tracking. This research contributes to the broader discourse on AI-driven education, paving the way for innovative approaches in student evaluation and institutional decision-making.

CHAPTER 3

SYSTEM ARCHITECTURE

3.1. THREE TIER ARCHITECTURE:

The Student Achievement Tracking System (SATS) is designed to efficiently track and monitor students' academic and extracurricular progress. The system follows a three-tier architecture, ensuring seamless data processing, scalability, and security.The architecture consists of the following layers:

- **Frontend (User Interface/Presentation Layer):**

This layer serves as the primary interface for students, teachers, parents, and administrators. It provides a user-friendly dashboard for accessing student profiles, academic records, attendance data, and performance analytics. Developed using React.js, it ensures a responsive design that works across desktops, tablets, and mobile devices. It supports secure authentication mechanisms and role-based access control.

- **Backend (Application Logic Layer):**

The backend processes user requests, business logic, and system functionalities.
Built using Node.js, it handles API requests, processes data, and implements role-based access for different users (students, teachers, administrators). This layer manages operations such as storing student records, generating reports, sending notifications, and handling analytics.

- **Database Layer:**

The database layer is responsible for storing and retrieving student profiles, academic records, attendance data, and performance analytics. Uses MongoDB or PostgreSQL, ensuring high scalability and structured data management. It supports data encryption, regular backups, and access controls to maintain security and integrity.

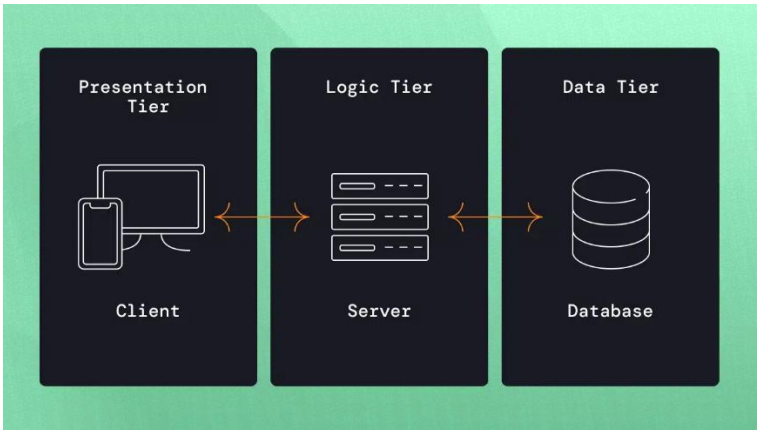

Figure 3.1 Three Tier Architecture

This three-tier architecture provides a robust structure for SATS, enabling efficient data management, secure access, and seamless scalability to accommodate growing numbers of students and academic records.

3.1.1. SYSTEM MODULES:

The Student Achievement Tracking System (SATS) is designed with a well-structured three-tier architecture, ensuring efficient data management, real-time performance tracking, and secure access control. The system consists of the Frontend Layer (User Interface), Backend Layer (Application Logic), and Database Layer (Storage & Management) to provide seamless functionality.

The Frontend Layer, developed using React.js and Tailwind CSS, offers an interactive dashboard accessible to students, teachers, administrators, and parents. The Admin Dashboard allows administrators to monitor student progress, generate performance reports, and analyze trends in academic achievements and extracurricular activities. Meanwhile, the Student Dashboard provides students with real-time access to their academic records, attendance, and extracurricular participation through visual analytics, such as charts and graphs. The frontend ensures role-based access control, allowing authorized users to access relevant information securely.

The Backend Layer, built using Node.js and Golang, manages request processing, authentication, data validation, and business logic. It supports automated report generation,

tracks student academic performance, extracurricular involvement, and attendance records, and integrates seamlessly for synchronized student data. Additionally, JWT-based authentication is implemented to ensure secure access for different user roles, maintaining data integrity and privacy.

The Database Layer, utilizing SqlYog, is responsible for storing structured student data, including academic records, extracurricular achievements, attendance logs, and reports. Key database collections or tables include student_profiles, academic_records, attendance_data, achievement_logs, and performance_reports. The system ensures data encryption, regular backups, and real-time synchronization between the backend and stored information, facilitating seamless data retrieval and analysis. By integrating these three layers, SATS provides an efficient, scalable, and secure platform for tracking student achievements, generating insights, and enhancing the educational monitoring process.

3.2. DATABASE SCHEMA AND ER DIAGRAM:

3.2.1. DB SCHEMA:

The Student Achievement Tracking System (SATS) is designed with a well-structured relational database schema to efficiently store, manage, and retrieve student performance data. The system comprises multiple interconnected tables that ensure data integrity, consistency, and optimized querying for seamless performance tracking and report generation. This schema enables students, teachers, and administrators to access and analyze data effectively. The key tables in the system include:

- **users_details**: Maintains information for all users, including students, mentors, and administrators, along with login credentials, contact details, and role-based access controls.
- **student_details**: Stores essential student information, such as student ID, name, department, and academic year.
- **academic_data**: Records semester-wise academic performance, including subject-wise scores, GPA, and overall progress.
- **grades_data**: Contains detailed grade distributions across different subjects and

assessments.

- **attendance_data**: Keeps track of student attendance, including class participation, attendance percentage, and absences.
- **achievements_details**: Logs student accomplishments in technical, non-technical, research, and project-related activities, covering patents, certifications, competitions, and presentations.
- **manage_achievements**: Allows administrators to review, verify, and approve student-submitted achievements before they are officially recorded.
- **mentors_details**: Stores mentor information, including assigned students, roles, and feedback records.

This optimized database design ensures real-time data access, secure authentication, and efficient performance tracking, making SATS a scalable and reliable solution for monitoring student achievements.

Additionally, SATS features an automated email notification system to keep parents informed about their child's academic progress and accomplishments. Every week, the system generates a detailed summary of the student's academic records, attendance, and recent achievements. This report is automatically delivered to registered parent email addresses, fostering better communication and engagement. The system also allows customization, enabling parents to receive additional alerts for specific milestones or significant performance changes. By automating the reporting process, SATS enhances transparency, parental involvement, and timely updates on student progress.

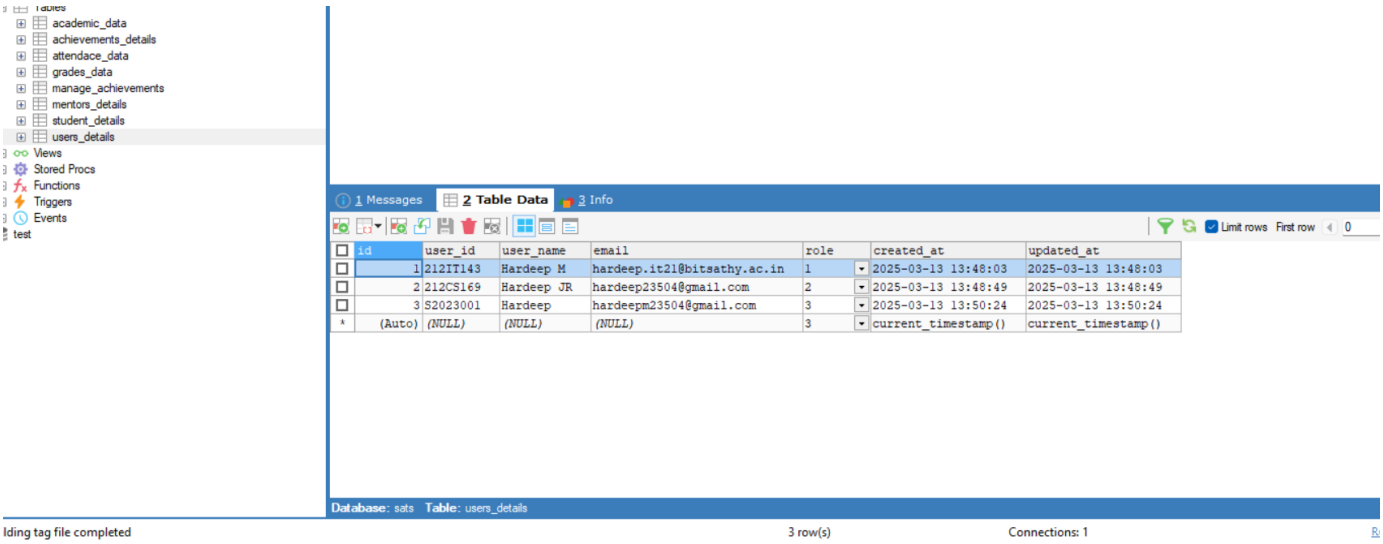

Figure 3.2 Table Data

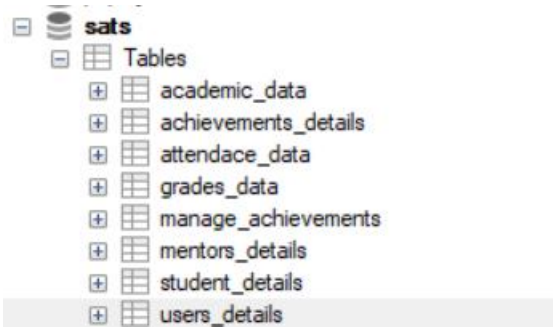

Figure 3.3 Tables in Sqlyog

3.2.2. ENTITY RELATIONSHIP

The Entity-Relationship Diagram (ERD) represents the foundational structure of the Student Achievement Tracking Portal, outlining the relationships between different database entities and how they interact. Designed using a relational database model, it ensures data accuracy, consistency, and efficient retrieval, making it easier to track student achievements seamlessly.

By structuring data logically, the ERD facilitates smooth verification processes, performance evaluations, and streamlined communication among students, teachers, mentors, and administrators. The Figure 3.2 below provides a detailed view of the system's Entity-Relationship Diagram.

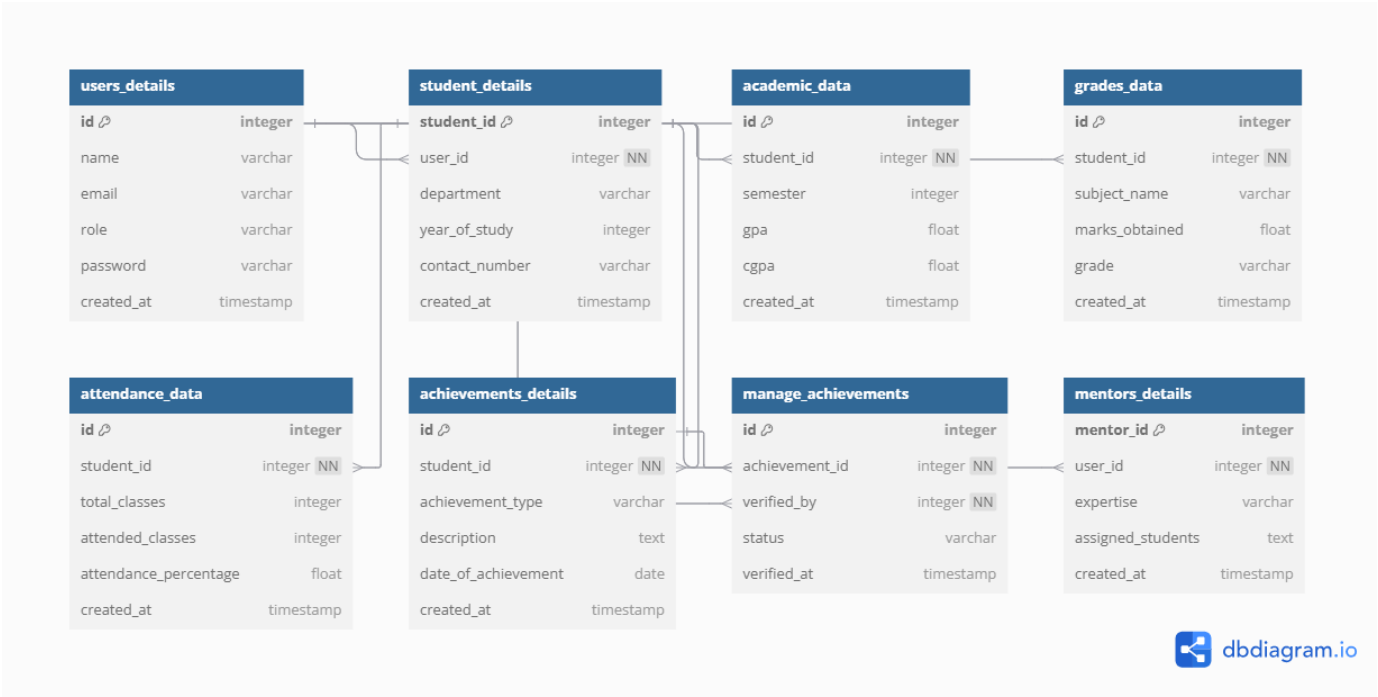

Figure 3.4 Entity-Relationship Diagram

➢ **One-to-Many Relationships:**

The Users Table serves as the primary hub within the database, establishing one-to-many relationships with multiple other tables, including Student Details, Academic Data, Attendance Data, Achievements, and Manage Achievements. This setup ensures that all relevant student information, such as academic records, attendance, and accomplishments, is efficiently recorded and accessible.

Examples:

- A student (user_id) can have multiple academic records across different semesters, which are stored in the Academic Data Table.
- A student can earn several achievements (such as patents, research papers, certifications), all of which are recorded in the Achievements Table.
- A student's attendance details for various semesters are logged in the Attendance Data Table.These relationships provide a structured framework for tracking and analyzing student performance across multiple aspects.

➢ **Many-to-One Relationship in Achievement Verification**

The Manage Achievements Table plays a crucial role in the achievement verification process. This table follows a many-to-one relationship, where multiple student-submitted achievements are reviewed and approved by a single mentor or administrator.

Examples:

- A mentor or admin is responsible for verifying multiple student achievements, assigning statuses such as Approved, Rejected, or Pending.
- Once an achievement is approved, students can track it in real time through the system.
- This structured approval process ensures fair evaluation and accurate documentation of student accomplishments.

➢ **Real-Time Updates and Data Synchronization**

One of the key advantages of the Student Achievement Tracking Portal is its ability to update data in real time, ensuring that student performance metrics and achievements remain current and accurate.

Key Functionalities:

- Students can upload achievements (such as research papers, patents, and certifications) for review by mentors or admins.
- Faculty members periodically update academic performance and attendance records.
- Admins communicate achievement updates to students using notification systems (SMS/Email APIs).
- The system generates dynamic reports and analytics, allowing students, teachers, and parents to view real-time performance insights.

By maintaining transparency and accuracy, this system provides an efficient and user-friendly approach to monitoring student progress.

The Entity-Relationship Diagram (ERD) serves as a structured model for organizing and managing student performance data within the Student Achievement Tracking System (SATS). It facilitates the integration of various academic records, technical competencies,

Achievement Details.

The ERD incorporates one-to-many and many-to-one relationships, allowing for efficient data management and ensuring that updates are reflected in real-time. This approach enables a comprehensive and accurate assessment of student performance across multiple parameters. By leveraging a well-structured relational model, SATS offers a scalable, transparent, and efficient solution for tracking and ranking student achievements. The system simplifies performance evaluation while maintaining data accuracy and accessibility for students, faculty, and administrators.

CHAPTER 4
SYSTEM FEATURES AND CORE FUNCTIONALITIES

The Student Achievement Tracking System (SATS) is designed to provide an efficient, data-driven approach to monitoring and evaluating student accomplishments across various domains, including academics, research, extracurricular activities, and certifications. The system ensures a structured and transparent way of tracking achievements while enabling real-time progress analysis.

The platform supports three primary user roles: Admin, Faculty, and Student, each with distinct functionalities to streamline operations. Students can submit achievements for review, faculty members can validate and assess performance, and admins oversee the entire process, ensuring smooth verification, communication, and data management.

4.1. ADMIN FUNCTIONALITIES

The Administrator holds the highest level of control within the Student Achievement Tracking Portal and is responsible for overseeing student records, verifying achievements, and generating performance reports. The admin ensures the seamless operation of the system, facilitating transparent and efficient evaluation of student accomplishments.

The admin dashboard provides an intuitive interface to track student progress, validate submitted achievements, and generate insightful reports to aid in decision-making. The key administrative functionalities include:

- **Student Data Management** – Add, update, and manage student profiles, including academic records and achievements.
- **Achievement Verification** – Review and approve student-submitted achievements before they are officially recorded in the system.
- **Performance Analysis** – Access analytical insights, visual reports, and trend analysis on student performance.
- **Report Generation** – Create customized reports for faculty, students, and stakeholders

for academic purposes.

- **Role-Based Access Control** – Manage user roles and permissions to ensure data security and controlled system access.
- **Automated Notifications** – Trigger notifications to students, faculty, and parents regarding achievement approvals, pending verifications, or report availability.

4.1.1. Automated Email Notification System

The Student Achievement Tracking Portal features an Automated Email Notification System that keeps parents informed about their child's progress. This system automatically delivers weekly attendance reports and achievement updates via Gmail API, ensuring timely and consistent communication.

Key Features of the Automated Email Notification System

- **Weekly Attendance Reports**
  - The system retrieves attendance records from the Attendance Database every 7 days.
  - A Weekly Report Generator processes the data to create a structured attendance report.
  - The finalized report is then dispatched to parents through Gmail API, ensuring an automated and reliable notification system.
- **Automated Achievement Update Notifications**
  - Every 7 days, the system gathers newly approved achievements from the Achievements Database.
  - The Achievement Email Generator compiles this information into a clear and concise report.
  - The system then sends a consolidated email update to parents via Gmail API.
  - This approach prevents frequent notifications while ensuring parents stay informed about their child’s accomplishments.

- **Secure & Efficient Gmail API Integration**
  - The system utilizes Gmail App Passwords to ensure secure and authenticated email dispatch.
  - The process is fully automated, eliminating manual intervention and improving efficiency.
- **Improved Parental Engagement**
  - Parents receive structured and easy-to-read emails summarizing their child's weekly attendance and recent achievements.
  - This system fosters better communication between parents and the institution, ensuring continuous monitoring of student progress.

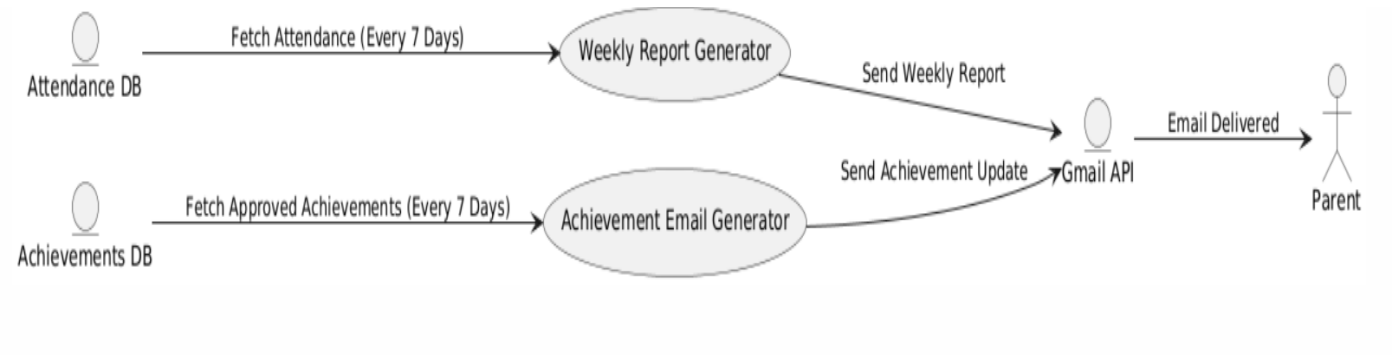

Figure 4.1. Automated Achievement Update

4.1.2. Data Management:

The Student Achievement Tracking System (SATS) ensures efficient data management by providing a centralized platform for storing, updating, and analyzing student achievements. The system is designed to handle large volumes of student data, ensuring accuracy, security, and real-time updates.

Key Features of Data Management and Updates

- **Centralized Data Storage**
  - Student profiles, academic records, extracurricular activities, and attendance are stored in a structured database.
  - The system eliminates manual data entry errors by automating student information updates.
  - Role-based access control ensures that only authorized users (teachers, admins)

can modify records.

- **Real-Time Data Updates**
  - The system allows instant modifications to student profiles, academic records, and achievements.
  - Any changes made to the database (e.g., grade updates, new achievements) reflect immediately in student reports.
  - Automated processes ensure synchronization with integrated LMS or SIS platforms.
- **Automated Achievement Tracking**
  - Newly added achievements undergo an approval process before being stored in the database.
  - Approved achievements are automatically reflected in performance analytics and ranking systems.
  - The system supports bulk data uploads for easier management of large student records.
- **Performance Analytics & Data Insights**
  - Real-time analytics provide insights into academic progress and student growth trends.
  - Dashboards with charts and graphs summarize student achievements, attendance, and performance.
  - Schools can filter data by subject, grade, semester, or activity to generate customized reports.
- **Attendance & Academic Records Management**
  - Attendance data is automatically updated at regular intervals.
  - The system ensures seamless integration with attendance tracking systems for real-time updates.
  - Academic records are stored with version control, ensuring past performance history is maintained.
- **Secure Data Handling**
  - Encrypted storage ensures that sensitive student information remains protected.
  - Role-based permissions control who can view, modify, or approve student data.

- Automated data backup prevents loss of information due to system failures.

➢ **Scalability & Future-Proofing**

- The system is designed to scale efficiently, handling increasing student enrollments and data loads.
- A cloud-based architecture ensures optimal performance without relying on local infrastructure.
- Future updates can integrate AI-based analytics to provide predictive insights into student performance.

4.1.3. Achievement Approval and Weekly Reporting

The Student Achievement Tracking System (SATS) is designed to ensure student accomplishments are validated, approved, and effectively communicated to key stakeholders. The system facilitates admin approval of student achievements, mentor access to mentee progress, and automated weekly notifications to parents.

Key Features of Achievement Approval and Reporting:

➢ **Admin Approval of Student Achievements**

- Students can submit their achievements, such as certifications, research papers, projects, and extracurricular accomplishments, through the system.
- Admins review and verify the submitted achievements before approving them to maintain authenticity.
- Once approved, the achievements are automatically updated in student profiles, analytics dashboards, and ranking systems.
- The system includes a bulk approval feature, enabling admins to efficiently manage multiple achievement submissions at once.

➢ **Mentor Access to Mentee Data**

- Mentors are granted access to track and assess the progress of their assigned students or mentees.
- Access is restricted to assigned students only, ensuring data privacy and a personalized tracking experience.

- Mentors can provide feedback, insights, and guidance to their mentees based on academic and extracurricular achievements.
- Real-time access to student performance data helps mentors offer timely support and recommendations.

➢ **Weekly Achievement Notifications to Parents**

- Every seven days, the system compiles a detailed report of newly approved student achievements.
- The Automated Email Notification System delivers an achievement summary to parents using the Gmail API.
- Emails are structured to be clear, concise, and informative, ensuring parents stay updated without feeling overwhelmed.
- This consistent communication helps enhance parental involvement in their child's academic journey.

➢ **Weekly Attendance and Performance Reports**

- The system retrieves attendance records from the database and generates a weekly attendance summary for parents.
- Reports include performance analytics covering grades, extracurricular participation, and ranking updates.
- Parents receive a consolidated email that combines both attendance and approved achievement records for a comprehensive overview.
- The system allows parents to customize notification settings, choosing how frequently they receive updates.

➢ **Transparency and Efficiency**

- The system maintains a record of pending and approved achievements, ensuring full transparency in the approval process.
- Timestamped approvals provide an audit trail, showing when and by whom an achievement was verified.
- The automated weekly reporting mechanism eliminates the need for manual intervention, ensuring timely and accurate updates.

4.2. FACULTY FUNCTIONALITIES:

Faculty members play a vital role in guiding students academically and professionally by monitoring their progress, providing feedback, and assisting in career development. The Student Achievement Tracking System (SATS) offers faculty interactive dashboards to track student performance, including grades, attendance, and extracurricular activities in real time. They can schedule and evaluate internal assessments, automate grading, and provide personalized feedback to help students improve. Additionally, faculty can recommend relevant training programs, certifications, and internships to support career planning. The system facilitates seamless communication through notifications and mentorship sessions, enabling faculty to engage with students effectively. By leveraging data-driven insights, faculty can identify areas for improvement, suggest learning strategies, and collaborate with placement officers to connect students with suitable career opportunities, ensuring holistic academic and professional growth.

4.2.1. Access to Student Performance

The Student Achievement Tracking System (SATS) provides faculty with a comprehensive database of student performance, covering academic progress, internal assessments, and technical accomplishments. Faculty can access detailed records, including semester-wise grades, CGPA, internal training evaluations, and extracurricular achievements. The system also tracks students' participation in coding platforms, monitoring problem-solving statistics, repository contributions, and project development activities. This granular data enables faculty to assess individual strengths and weaknesses, offering targeted guidance to enhance student performance.

4.2.2 Monitoring Student Rankings and Providing Mentorship

SATS enables faculty to track student rankings based on academic and technical achievements, helping them identify students who require additional support. By analyzing these rankings, faculty can provide personalized mentorship, recommend skill enhancement strategies, and encourage participation in competitions, hackathons, and training programs. This mentorship fosters students' technical and professional development, ensuring they are well-prepared for future career opportunities.

4.2.3 Providing Feedback to Students

Faculty members can actively engage with students by offering constructive feedback on their academic and technical performance. They can suggest relevant certification programs, coding challenges, and additional training sessions to improve student skills. Personalized recommendations help students strengthen their weaker areas while reinforcing their strengths, ultimately making them more competitive in academic and professional settings.

4.3. STUDENT FUNCTIONALITIES:

The Student Achievement Tracking System (SATS) provides an intuitive and interactive interface for students to track their academic, technical, and extracurricular achievements. Through a dedicated dashboard, students receive real-time insights into their progress, allowing them to identify strengths, work on areas of improvement, and stay motivated for future opportunities.

4.3.1 Personalized Dashboard

The student dashboard acts as a centralized platform for monitoring performance, setting goals, and tracking achievements. Key features include:

- **Comprehensive Achievement Overview:** Displays academic records, technical certifications, project submissions, research papers, and participation in extracurricular activities.
- **Rank and Peer Comparison:** Allows students to compare their performance with peers within their department or institution based on approved achievements.
- **Visual Progress Tracking:** Graphs and charts illustrate trends in performance across academics, technical skills, and extracurricular engagements.
- **Goal Setting and Personalized Recommendations:** Students can set academic or skill-based goals while receiving system-generated recommendations for improvement.

4.3.2 Performance Analysis and Insights

SATS provides students with in-depth analytics to help them assess their progress in various domains:

- **Technical and Skill-Based Performance**
  - Tracks participation in coding challenges, hackathons, and certification programs.
  - Displays problem-solving proficiency based on competitive programming platforms.
  - Highlights project development contributions, including repository activity and collaboration metrics.

- **Academic Progress Insights**
  - Provides semester-wise performance tracking with GPA and subject-specific analytics.
  - Identifies trends in coursework to highlight strengths and areas that need improvement.
  - Displays feedback from faculty on assessments and academic participation.

- **Extracurricular and Leadership Engagement**
  - Logs achievements in cultural, sports, and leadership activities.
  - Highlights participation in national and international competitions, internships, and research publications.
  - Tracks community engagement through volunteering or student-led initiatives.

4.4 SYSTEM BENEFITS AND IMPACTS

The Student Achievement Tracking System (SATS) enhances student progress monitoring by automating achievement verification, offering real-time insights, and improving communication among stakeholders. By integrating academic, technical, and extracurricular accomplishments, the system provides a structured and data-driven approach to evaluating student success.

- **Seamless Achievement Approval**: The system simplifies the validation process for

student accomplishments, minimizing administrative workload while ensuring credibility.

- **Live Progress Monitoring**: Students gain access to a comprehensive dashboard that allows them to track academic and extracurricular achievements, encouraging continuous growth and goal-setting.
- **Faculty Mentorship and Support**: Faculty members can review detailed student performance data, offer targeted guidance, and assist mentees in strengthening weaker areas through data-driven mentoring.
- **Automated Parent Notifications**: Weekly reports summarizing student achievements, attendance, and performance trends are automatically sent to parents, ensuring consistent involvement in their child's development.
- **Fair and Transparent Evaluation**: The system applies standardized metrics for assessing student performance, eliminating subjectivity and ensuring an impartial ranking process.
- **Institutional Advancement**: Educational institutions can leverage SATS to enhance placement rates, identify performance trends across batches, and optimize academic and training strategies.
- **Enhanced Stakeholder Collaboration**: The platform fosters seamless communication among students, faculty, admins, and parents, promoting engagement, timely feedback, and continuous learning.

CHAPTER – 5

IMPLEMENTATION

The Student Achievement Tracking System (SATS) is designed to systematically track, verify, and evaluate student accomplishments across academic, technical, and extracurricular domains. This chapter details the technology stack, system architecture, integration methods, algorithm design, and data flow employed to create an efficient and scalable tracking system.

5.1 SYSTEM ARCHITECTURE

The system follows a three-tier architecture, ensuring scalability, modularity, and efficient data management. It consists of three main layers: Frontend (Client-Side Interface), Backend (Server-Side Logic), and Database Layer.

1. Frontend (Client-Side Interface)

The frontend is developed using React.js with Tailwind CSS, providing an intuitive, responsive, and visually appealing user experience. Key features include:

- **Student Dashboard:** Displays verified achievements, academic progress, certifications, and extracurricular activities in an interactive layout.
- **Faculty and Admin Dashboard:** Offers batch-wise analytics, student performance insights, and achievement verification tools.
- **Automated Notifications:** Sends real-time updates on achievement approvals, faculty feedback, and pending verifications.
- **Responsive UI:** Ensures accessibility across devices for students, faculty, admins, and parents.

2. Backend (Server-Side Logic)

The backend is powered by Node.js for its high scalability and asynchronous processing capabilities. Key functionalities include:

- **Data Processing and Verification:** Automatically imports and verifies achievements submitted by students.
- **Role-Based Authentication & Authorization:** Ensures secure access for students, faculty, admins, and parents.
- **Integration with Third-Party APIs:** Supports APIs for communication (SMS, Email) and external learning platforms for certification verification.
- **Automated Achievement Ranking:** Uses a weightage-based algorithm to categorize and rank student achievements.

3. Database Layer

The system employs MongoDB for flexible and scalable data storage. Key database features include:

- **Efficient Data Indexing:** Optimized querying for quick retrieval of student records and performance analytics.
- **Structured Data Relationships**: Maintains links between student profiles, verified achievements, academic records, and faculty feedback.
- **Data Normalization & Security**: Ensures data consistency and protects sensitive information through encryption and role-based access controls**.**

5.2. DATAFLOW AND INTEGRATION:

The Student Achievement Tracking System (SATS) provides a secure and user-friendly login process through Google Authentication, ensuring seamless access while maintaining data security. Students, faculty, admins, and parents can log in using their institutional Google accounts, eliminating the need for manual credential management. The system implements role-based access control (RBAC), allowing different user types to

access relevant features. Students can submit, track, and manage their achievements, while faculty and admins verify and approve submissions. Parents receive real-time progress reports and updates. The authentication mechanism ensures that only authorized users can view and modify data, enhancing security and efficiency. Through this streamlined access control, SATS fosters a structured, transparent, and interactive environment for tracking student achievements.

5.3. SECURITY AND AUTHENTICATION

The Student Achievement Tracking System (SATS) ensures robust security and access control through a combination of authentication, authorization, and data protection mechanisms. The system integrates Google Authentication for secure and seamless login, reducing the risk of credential theft while streamlining user access. Additionally, JWT (JSON Web Token)-based authentication is implemented to maintain secure and encrypted login sessions, ensuring that only authenticated users can access their respective dashboards.

To enforce Role-Based Access Control (RBAC), different user roles—students, faculty, administrators, and parents—are granted appropriate privileges. Students can submit and track achievements, faculty and admins have verification and approval rights, and parents can access real-time progress reports. This structured access prevents unauthorized users from viewing or modifying sensitive student records.

For data integrity and protection, all communications are encrypted using TLS (Transport Layer Security), and the system operates over HTTPS to prevent data interception. Secure API calls are safeguarded with rate-limiting and access control policies to mitigate risks such as brute-force attacks and unauthorized data extraction. Additionally, activity logging and audit trails help in tracking system interactions, ensuring accountability.

With a scalable and secure architecture, SATS provides a reliable platform for tracking, verifying, and analyzing student achievements while prioritizing privacy, transparency, and system resilience against cyber threats.

CHAPTER 6

RESULTS AND DISCUSSION

6.1 ADMIN FUNCTIONALITY

6.1.1 ADMIN HOME PAGE

The Admin Home Page in the Student Achievement Tracking System (SATS) serves as a centralized hub, providing a comprehensive overview of student accomplishments, academic progress, and engagement in technical and extracurricular activities. The dashboard presents real-time insights into student performance, enabling administrators to monitor achievement trends, approve submitted records, and assess overall institutional progress.

A student achievement summary highlights the number of approved, pending, and rejected accomplishments, streamlining the verification process. Additionally, an academic performance distribution chart categorizes students based on their CGPA, attendance, and training participation, offering a data-driven perspective on student learning outcomes. The system also tracks technical skill development, showcasing certifications earned, project completions, and participation in hackathons or competitions.

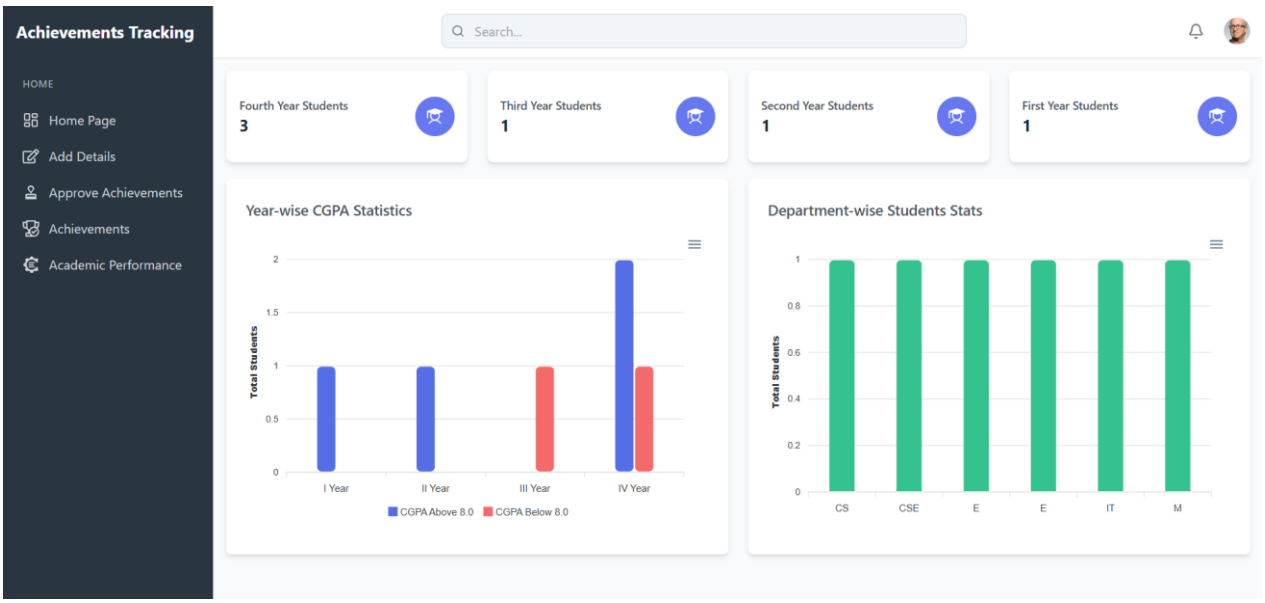

Figure 6.1 Admin Home Page

With interactive data visualizations, the Admin Dashboard enables decision-makers to refine training programs, identify students needing additional support, and improve

institutional strategies. The system ensures transparency and accountability by providing audit logs of verification activities, helping admins maintain a structured and effective student achievement tracking framework.

6.1.2 INPUT DATA MANAGEMENT

The Admin Panel in the Student Achievement Tracking System (SATS) offers a robust data management module, allowing administrators to efficiently handle large volumes of student records. The system supports bulk data import to streamline the entry of student information, academic performance, certifications, and extracurricular achievements. By enabling automated data validation, it minimizes errors and ensures consistency in records.

Admins can export student data in multiple formats, including CSV, Excel, and PDF, facilitating detailed reporting and trend analysis. The system provides editing and updating functionalities, allowing administrators to modify student profiles, verify achievement submissions, and track progress in academic and technical domains. Additionally, real-time monitoring tools assist in analyzing student engagement, training completion rates, and overall institutional performance.

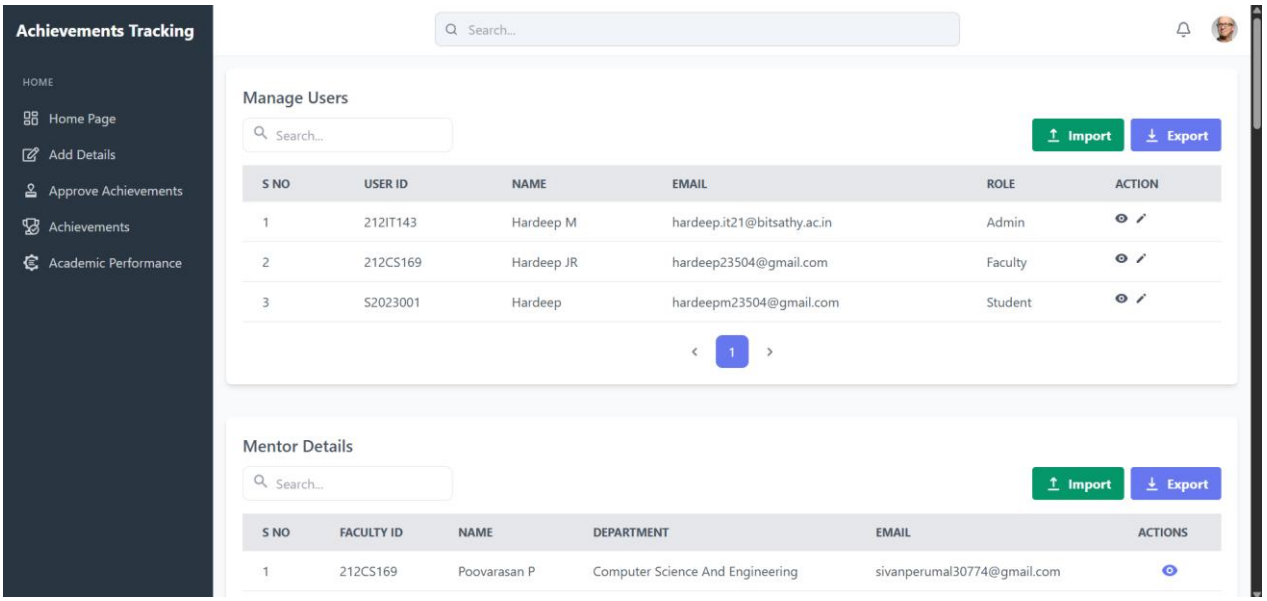

Figure 6.2 Input Data Management of Admin View

This centralized data management system enhances decision-making by providing insights into student development, enabling institutions to refine academic programs, monitor achievements, and improve training strategies. The seamless integration of

structured data handling ensures efficient record-keeping and fosters a data-driven approach to student progress tracking and placement readiness.

6.1.3. STUDENT ACADEMIC PERFORMANCE PAGE

The Student Academic Performance Page in the Student Achievement Tracking System (SATS) provides a centralized view of each student's academic and extracurricular journey. Administrators can access detailed student records, including academic performance, personal information, and educational background, through an intuitive dashboard [14].

A dynamic SGPA trend chart presents semester-wise academic progress, allowing admins to assess performance patterns at a glance. The profile section displays personal details, such as name, roll number, department, year of study, and contact information. Additionally, the educational details section includes CGPA, course enrollments, certifications, project work, and other academic milestones, offering a holistic view of student achievements.

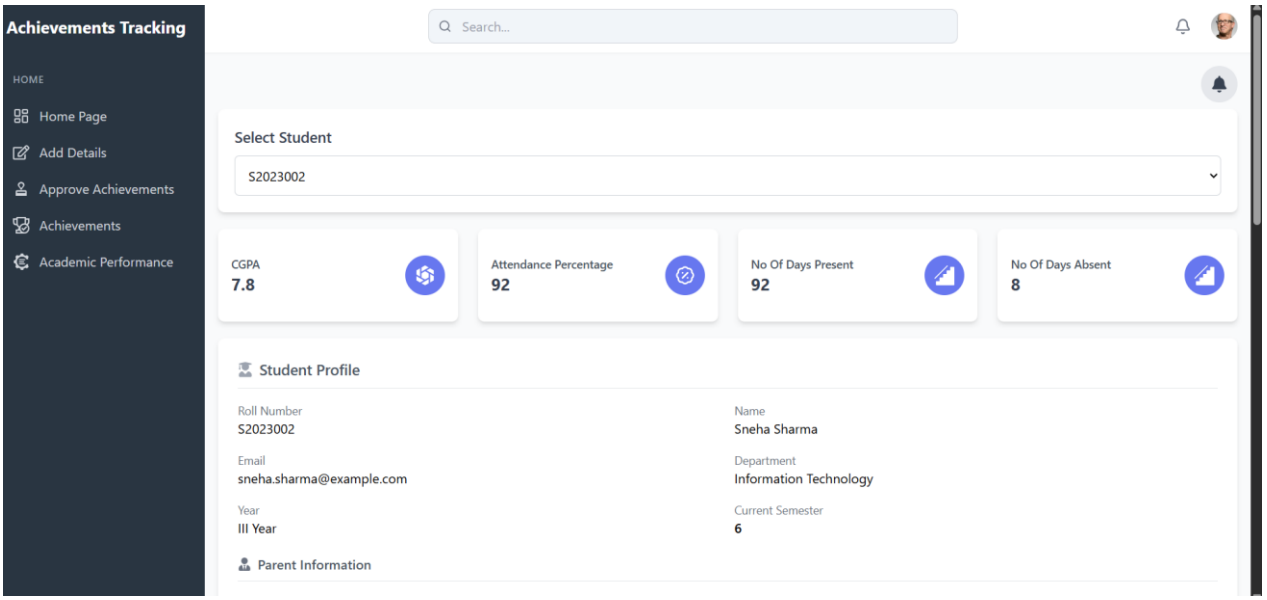

Figure 6.3 Student Academic Performance Page (Admin View)

The system ensures efficient monitoring of student progress, enabling administrators to make data-driven decisions regarding mentorship, skill development programs, and placement strategies. By integrating real-time performance tracking, the Student Profile Page enhances transparency and facilitates proactive academic and career planning for students.

6.1.4. MAIL AUTOMATION FUNCTIONALITIES

The Student Achievement Tracking System (SATS) includes automated email notifications to streamline communication between administrators, faculty, students, and parents. The system ensures that all stakeholders stay informed about important updates, approvals, and performance insights through real-time email alerts [11].

Figure 6.4 Weekly Attendance Report

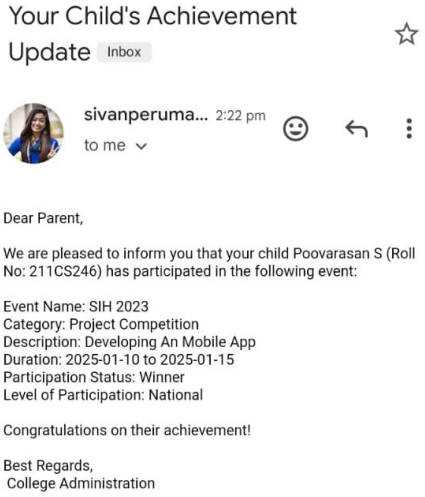

Figure 6.5 Weekly Achievement Report

The Admin Panel facilitates email automation, allowing administrators to send notifications regarding achievement approvals, verification status, and pending submissions. Once a student submits an achievement for review, an automated email is triggered to notify the admin or faculty for verification. Upon approval or rejection, the system sends an automated response to the student, updating them on the status.

Additionally, periodic progress reports are sent to students and parents, highlighting academic performance, extracurricular achievements, and placement readiness. Email alerts are also used for event notifications, upcoming deadlines, and training session reminders.

The email automation system is designed to enhance efficiency, ensuring timely communication while reducing manual effort for administrators. Secure SMTP integration and customized email templates ensure professional and reliable communication, keeping all users updated on their progress and necessary actions.

6.2 Faculty Functionality

The Faculty Dashboard in the Student Achievement Tracking Portal equips faculty members with essential tools to monitor and analyze the academic progress of their assigned students. While the dashboard layout remains similar to that of the Admin Panel, faculty access is restricted to their designated students, ensuring focused and personalized mentoring. Below is a breakdown of the key pages in the Faculty Panel:

6.2.1 Faculty Home Page

Faculty Home Page provides faculty members with a quick and insightful overview of student performance using key indicators. Faculty can monitor the placement status of their assigned batch, distinguishing between placed and unplaced students. Additionally, a bar chart visualization of academic performance trends categorizes students scoring above and below an 8.0 CGPA, enabling faculty to identify academically strong students and those needing support.

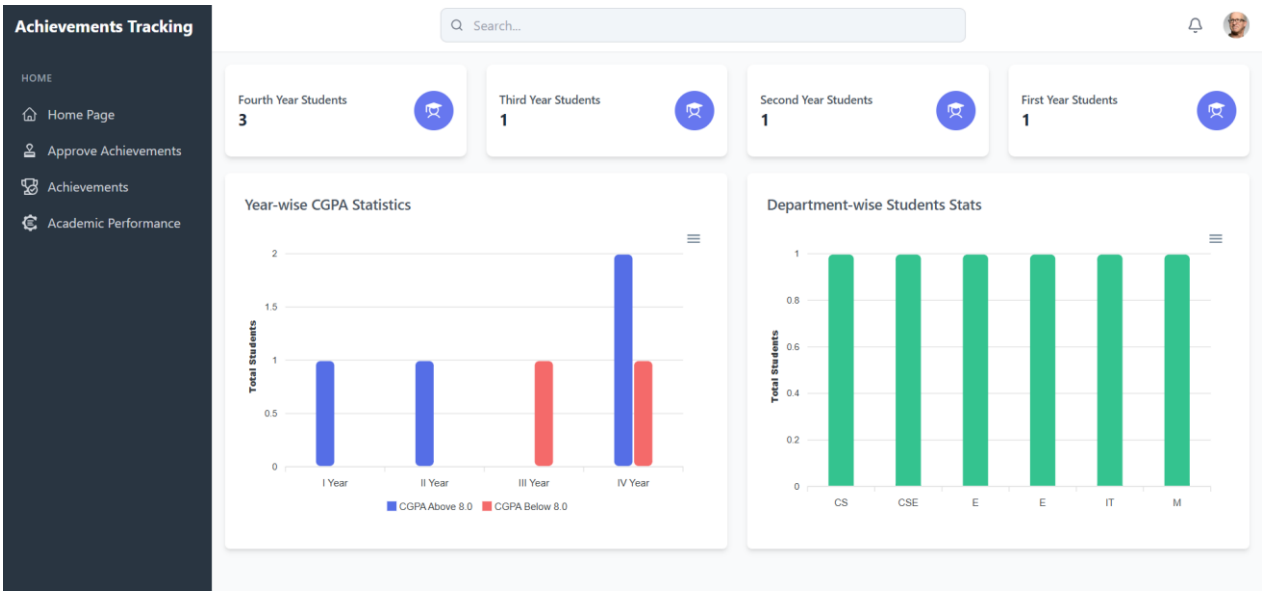

Figure 6.6 Faculty Home Page

6.2.2 Student Profiles

The Student Profiles Page presents a comprehensive academic overview of assigned students. Faculty members can analyze SGPA trends through interactive charts, review individual student profiles, and access their educational background. This integrated view

helps faculty assess student performance, identify those struggling academically, and implement personalized mentorship strategies. The detailed academic summary ensures that faculty can take proactive measures to support students in improving their technical and academic skills.

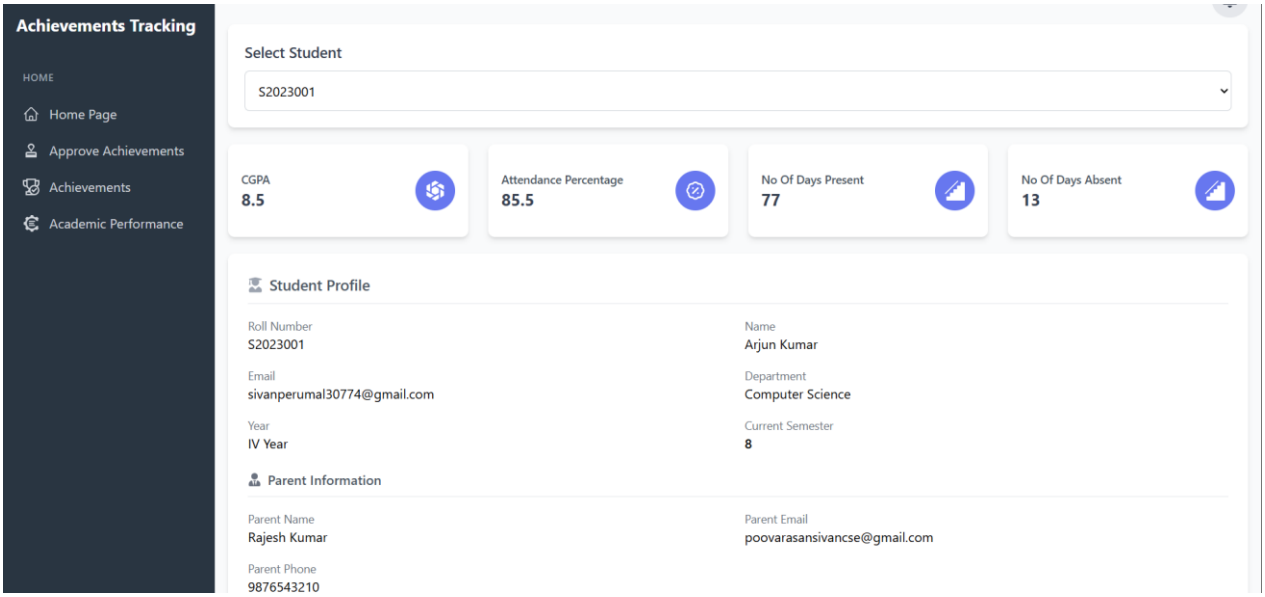

Figure 6.7 Student Profiles (Mentor View)

6.2.3 Mentor-Mentee Interaction

The Mentor-Mentee Interaction feature enables faculty mentors to effectively engage with their respective mentees and their parents. Mentors can view complete details of their assigned students, including academic progress, achievements, and areas requiring improvement. Additionally, the portal facilitates direct communication with parents, allowing mentors to provide updates on student performance, discuss academic concerns, and ensure a collaborative approach to student development. This feature strengthens the mentorship framework by fostering better student support and parental involvement in academic progress.

6.3 Student Functionality

The Student Panel in the Student Achievement Tracking Portal serves as a personalized space where students can actively monitor their academic progress, placement status, and skill development journey. It provides a structured and intuitive interface that enables students to track their overall performance while staying informed about their achievements and approvals. The following sections outline the key features of the Student Panel:

6.3.1 Student Home Page

The Student Home Page offers an organized dashboard for students to track their academic records, placement status, and skill development progress. A semester-wise SGPA analysis, presented through an interactive bar chart, allows students to assess their academic performance trends over time. Placement status is also prominently displayed, indicating whether a student has been placed or is still in the job search process.

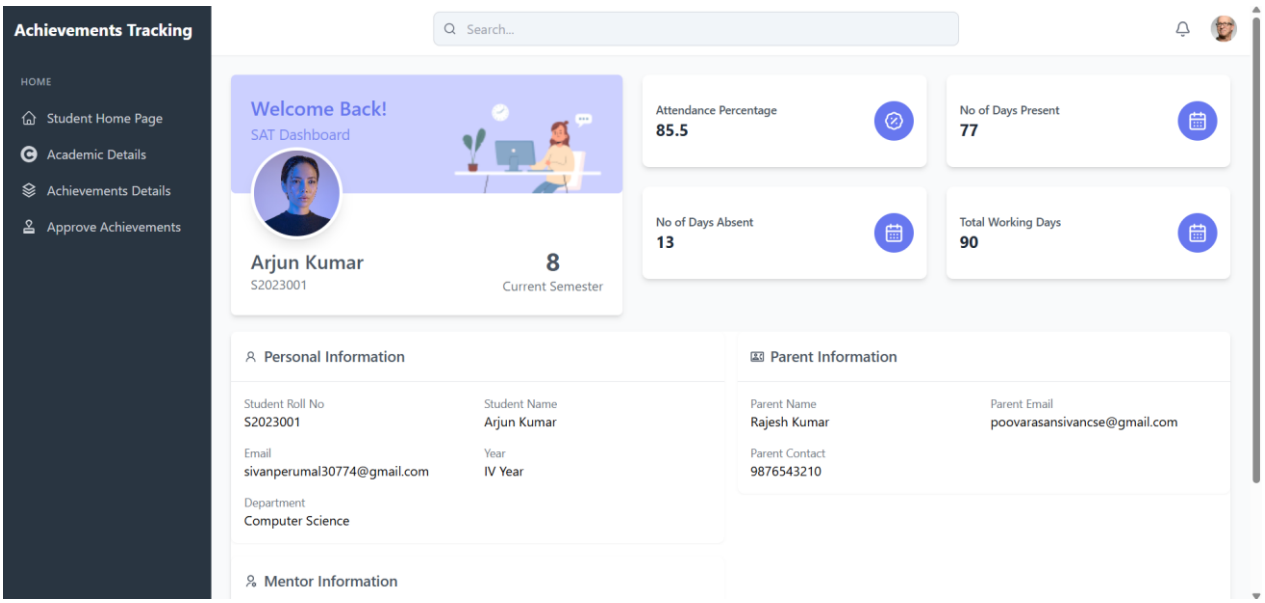

Figure 6.8 Student Home Page

To support skill monitoring, the page integrates a ranking system based on full-stack training points, enabling students to evaluate their technical growth in comparison to peers. Additionally, a profile card displays essential details such as the student's image, name, roll number, batch, personal information, and educational background, making it easy to access relevant information at a glance.

6.3.2 Achievement Status Tracking

A dedicated section on the Student Panel allows students to view the status of their uploaded achievements, ensuring transparency in the verification process. Students can track whether their submissions—such as patents, research papers, projects, technical and non-technical event participation—are approved, pending, or rejected. This functionality enables students to stay updated on their recognized accomplishments and take necessary

actions if approvals are delayed.

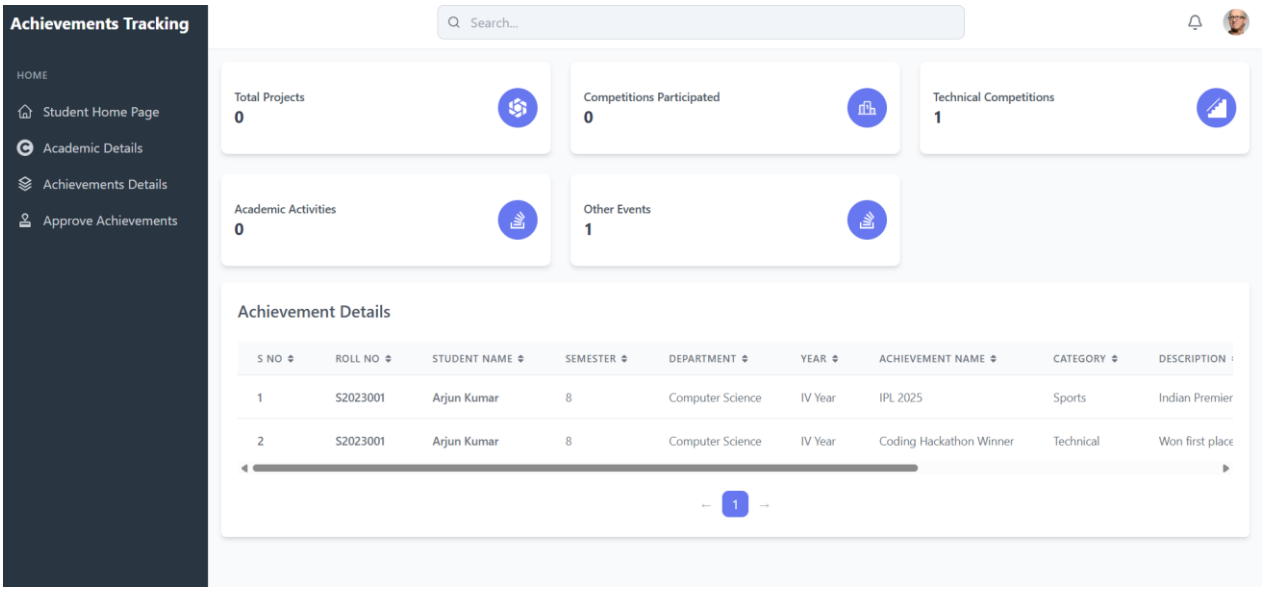

Figure 6.9 Achievement Status Tracking

6.3.3 Achievement Upload Feature

The Student Achievement Tracking Portal enables students to upload their achievements, ensuring that their academic and extracurricular accomplishments are recognized and recorded systematically.

Students can submit details of their achievements in various categories, such as:

- Technical (Hackathons, Coding Competitions, Research Papers)
- Academic (Top Performer, Scholarships, Certifications)
- Sports (Intercollege and National-Level Events)
- Projects (Innovation Challenges, Patent Submissions)
- Non-Technical (Debates, Cultural Events, Leadership Roles)

The upload process involves filling out essential details, including the achievement name, category, description, semester, and supporting documents. Once submitted, the achievement undergoes an approval process, where administrators verify the authenticity of the submission.

Students can track the status of their uploaded achievements, categorized as:

- Pending (Awaiting verification)
- Approved (Successfully verified and recorded)

- Rejected (Not meeting the required criteria)

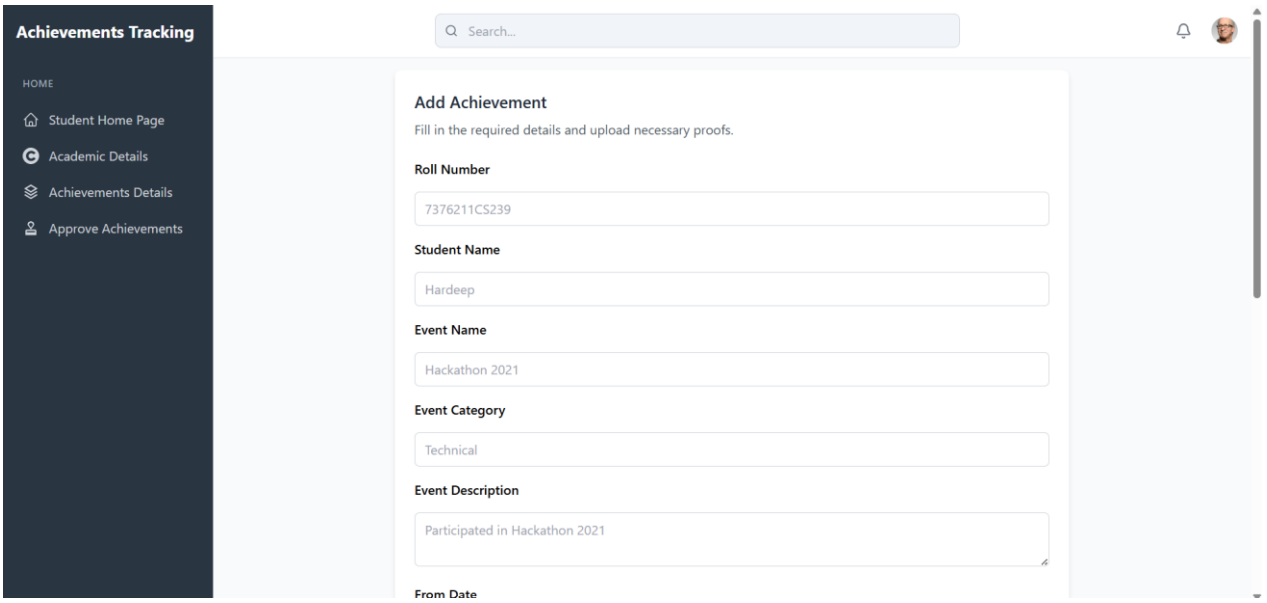

Figure 6.10 Achievement Upload Feature

CHAPTER 7

CONCLUSION AND FUTURE WORK

The Student Achievement Tracking and Performance Evaluation System is a comprehensive platform designed to monitor, evaluate, and enhance student performance across multiple dimensions, including academic progress, technical proficiency, and extracurricular achievements. By integrating automated data extraction, ranking algorithms, and real-time analytics, the system offers a transparent and data-driven approach to performance assessment for students, faculty, and administrators.

This system enables students to track their academic growth, showcase their achievements, and receive personalized guidance based on real-time performance insights. The platform categorizes achievements across various domains, such as technical events, academic milestones, sports, research contributions, and project innovations, ensuring a structured repository of student accomplishments.

Key Features and Benefits:

- **Real-time Performance Monitoring**: Visual dashboards display SGPA trends, placement status, and skill progression.
- **Automated Achievement Tracking**: Students can upload their accomplishments, which are then verified by administrators before being recorded.
- **Data-Driven Decision Making**: Faculty can analyze student strengths and areas for improvement using advanced analytics and ranking mechanisms.
- **Personalized Skill Development**: Insights into full-stack development, coding performance, and technical skills help students stay industry-ready.
- **Mentor & Parent Integration**: Mentors can track their mentees' progress, while parents receive updates via notifications.

Future Enhancements:

Gamification for Increased Engagement:

- **Leaderboards & Performance Rankings**: Students earn points and ranks based on achievements, fostering healthy competition.
- **Challenges & Rewards**: Faculty can introduce skill-based challenges, and students can earn badges or incentives for participation.
- **Achievement Streaks**: Encourages students to maintain consistent performance and participation in academic and extracurricular activities.

Advanced Reporting and Data Visualization:

- **Customizable Dashboards**: Allow users to personalize their analytics views based on their preferences.
- **Detailed Progress Reports**: Generate AI-driven academic and skill-based performance reports to help students and mentors track progress.
- **Comparative Analytics**: Compare student performance across departments, semesters, and peer groups.

Mobile App & Multi-Platform Accessibility

- **Responsive Web & Mobile App**: Develop a mobile-friendly version for easy access on smartphones and tablets.
- **Offline Data Access**: Enable students to view and update achievements offline, syncing once connected to the internet.

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CHAPTER 8

APPENDICES

I. Automated Email Notification Code:

```
func startCronJobs() {
    c := cron.New()
    // Run every Monday at 8 AM
    _, err := c.AddFunc("0 8 * * MON", func() {
        fmt.Println("Running Weekly Email Job at:", time.Now())
        routes.WeeklyEmailJob()
        routes.WeeklyAttendanceEmailJob()
    })
    if err != nil {
        log.Fatalf("Error scheduling cron job: %v", err)
    }
    c.Start()
    }
```

```
package routes


import (
   "fmt"
   "log"
   "net/smtp"
   "server/config"
```

```
    "time"
)

// Function to fetch new achievements from the past week
func getNewAchievements() ([]map[string]string, error) {
    weekAgo := time.Now().AddDate(0, 0, -7).Format("2006-01-02")

    query := `
        SELECT sa.roll_no, sa.student_name, sa.event_name, sa.event_category,
               sa.event_description, sa.from_date, sa.to_date,
               sa.participation_status, sa.level_of_participation, sd.parent_email
        FROM manage_achievements sa
        JOIN student_details sd ON sa.roll_no = sd.rollno
        WHERE sa.created_at >= ?
    `
    rows, err := config.Database.Query(query, weekAgo)
    if err != nil {
        return nil, err
    }
    defer rows.Close()

    var achievements []map[string]string
    for rows.Next() {
```

```
    var rollNo, studentName, eventName, eventCategory, eventDescription string
    var fromDate, toDate, participationStatus, level, parentEmail string

    if err := rows.Scan(&rollNo, &studentName, &eventName, &eventCategory, &eventDescription,
        &fromDate, &toDate, &participationStatus, &level, &parentEmail); err != nil {
        return nil, err
    }

    achievements = append(achievements, map[string]string{
        "roll_no":          rollNo,
        "student_name":     studentName,
        "event":            eventName,
        "category":         eventCategory,
        "description":      eventDescription,
        "from_date":        fromDate,
        "to_date":          toDate,
        "participation":    participationStatus,
        "level":            level,
        "email":            parentEmail,
    })
}
```

```
    return achievements, nil
}

// Function to send an email
func sendEmail(to, subject, body string) error {
    from := "hardeepm23504@gmail.com"
    password := "heza phuo hrup zllq"
    smtpHost := "smtp.gmail.com"
    smtpPort := "587"

    auth := smtp.PlainAuth("", from, password, smtpHost)

    msg := []byte(
        "From: " + from + "\r\n" +
            "To: " + to + "\r\n" +
            "Subject: " + subject + "\r\n" +
            "Content-Type: text/plain; charset=UTF-8\r\n\r\n" +
            body + "\r\n")

    err := smtp.SendMail(smtpHost+":"+smtpPort, auth, from, []string{to}, msg)
    return err
}
```

```
// Cron job to send weekly achievement emails
func WeeklyEmailJob() {
    achievements, err := getNewAchievements()
    if err != nil {
        log.Println("Error fetching achievements:", err)
        return
    }

    for _, ach := range achievements {
        emailBody := fmt.Sprintf(
            "Dear Parent,\n\n"+
                "We are pleased to inform you that your child %s (Roll No: %s) has participated in the following event:\n\n"+
                "Event Name: %s\n"+
                "Category: %s\n"+
                "Description: %s\n"+
                "Duration: %s to %s\n"+
                "Participation Status: %s\n"+
                "Level of Participation: %s\n\n"+
                "Congratulations on their achievement!\n\n"+
                "Best Regards,\n College Administration",
            ach["student_name"], ach["roll_no"], ach["event"], ach["category"],
            ach["description"], ach["from_date"], ach["to_date"],
```

```
            ach["participation"], ach["level"],
        )

        err := sendEmail(ach["email"], "Your Child's Achievement Update", emailBody)
        if err != nil {
            log.Println("Error sending email to", ach["email"], ":", err)
        } else {
            log.Println("Email sent to:", ach["email"])
        }
    }
}
```

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III. Individual Work Contribution:

Batch Member 1: (7376212IT143 & HARDEEP M)

- Designed the server architecture and database schema using SQL (SQLyog) for structured and optimized data storage.
- Developed RESTful APIs using Golang to handle student achievement submissions, admin verification, and notifications.
- Implemented JWT-based authentication for secure login and role-based access control (students, teachers, and admins).
- Configured error-handling middleware and input validation to enhance API reliability and security.
- Worked closely with the frontend team to ensure smooth API integration and optimized response formats.

Batch Member 2: (7376212IT115 & CHARANKUMAR S K)

- Developed the business logic for achievement verification, approval workflows, and role-based access management.
- Integrated automated email notifications using Gmail App Password and cron job functions for scheduled alerts.
- Implemented real-time notifications via third-party APIs (Twilio, SendGrid) to keep users updated on approvals and achievements.
- Built data analytics and reporting modules to provide insights into student progress and achievement trends.

Batch Member 3: (7376212IT151 & HAYMON R S)

- Designed and structured React.js components for student dashboards, achievement submission forms, and admin panels.
- Created responsive UI layouts using CSS Flexbox and Grid, ensuring a seamless experience across all devices.

- Styled reusable UI components (cards, buttons, navigation menus) to maintain a consistent and user-friendly design.
- Integrated automated email notifications using Gmail App Password and cron job functions for scheduled alerts.

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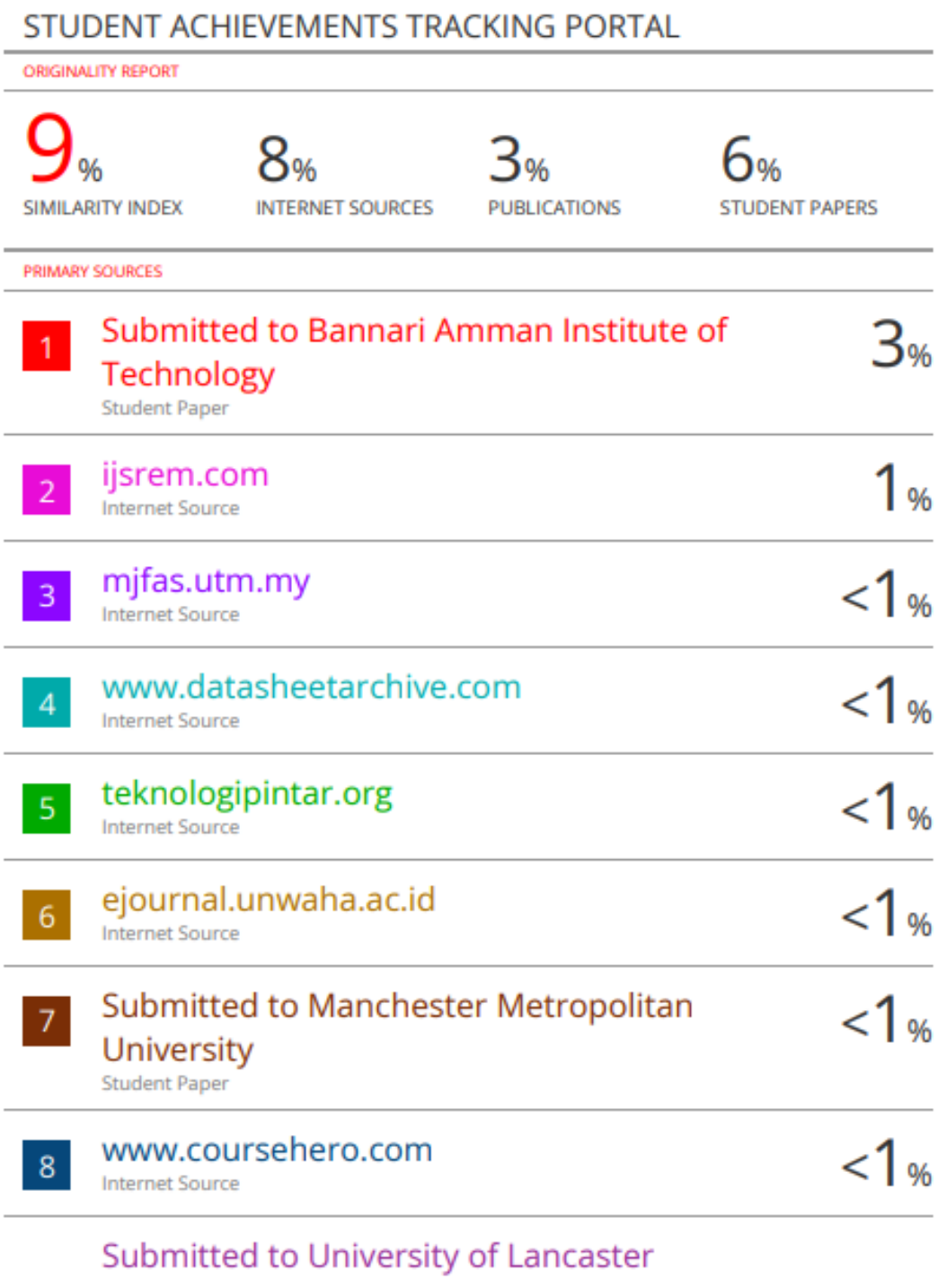

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