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A ROLE-BASED SMART COLLEGE ERP SYSTEM WITH AI-DRIVEN ANALYTICS AND DECISION SUPPORT

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ABSTRACT
An increase in the use of digital infrastructure throughout the higher education sector has created a need for comprehensive systems that can handle academic and administrative functions in an efficient, uniform manner. As many institutions still rely on a mix of separate systems or incomplete automated systems for their daily tasks, this results in duplicated data between programs and many times delays in completing a task and inadequate visibility into the operations of the institution. This paper discusses the design and implementation of a Smart College ERP Management System created to address the above challenges through a centralized, role-based architecture. This system uses a full stack approach with a responsive front-end, a powerful back-end, and a structured relational database providing redundancy and scalability. In addition to providing support for multiple user roles, including administrator, faculty member, student, accountant, librarian, and placement officer, the Smart College ERP Management System defines distinct access rights and functional responsibilities for all defined user roles. All core modules (admissions management, attendance management, examination processing, accounts receivable, library management, and placement management) are designed to integrate to produce a seamless environment for effective management of institutions. The Smart College ERP Management System enables users to access data displayed in tables and graphs and allows for the use of analytical tools to assess the past academic and behavioural performance of students with the purpose of determining potential risks and supporting timely decision-making. The development of the Smart College ERP Management System has enhanced many aspects of traditional ERP functionality

KEYWORDS: *Smart College ERP, Role-Based Access Control (RBAC), Artificial Intelligence (AI), Educational Management System, Full Stack Web Application, Predictive Analytics, Decision Support System.*

1. INTRODUCTION

As the pace of technology continues to race on, higher education has also experienced a dramatic shift in how operations are conducted throughout colleges/universities. The many academic and administrative processes are becoming more and more detailed at each institution allowing them to offer much more advanced services to their students than was ever possible before. Some of the examples of these activities include but are not limited to student admissions, attendance tracking and recording, exam processing, fee management, library services, and job placement coordination. It can be said that most institutions rely heavily on traditional or partially integrated systems to conduct this work in isolation of each other creating issues such as data redundancy, lack of transparency, increased time for processing & limited access to information. Overall these problems make a solid case for a properly integrated setup to assist with the institutional workflow.

Currently, there are several enterprise resource planning (ERP) software packages available that provide an efficient solution to help address the above-stated issues. ERP software provides an organization with a centralized approach to its multiple functional areas by combining the data files into one single system. ERP solutions can help improve coordination between departments within the institution; provide more accurate data reporting; support timely and informed decision-making; etc. It is not uncommon for many higher educational institutions to utilize traditional or legacy ERP systems because of their design limitations around flexibility, analytics, and customization for employees of different functions and job levels which are not designed to meet the rapidly changing needs associated with higher education today.

This paper presents a proposed Smart College ERP Management System that uses and focuses on the importance of role-based access controls and will enable higher education institutions to fully utilize technology to provide their students with the right tools & resources to become successful in academia and beyond.

2. LITERATURE SURVEY

The use of newer technologies in enterprise software development, cloud computing, and intelligent computing has changed the manner in which academic management systems are developed. The increasing number of ERP solutions found within higher education institutions [1], for instance, is indicative of an upward trend among these institutions as they attempt to unite all academic and administrative processes into one digital environment. The overall goal of an ERP system is to increase efficiencies within an institution's operation through integrating all processes needed for managing the admission, scheduling of classes, tracking student attendance, and administering exams or providing financial aid or supporting students.

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Building upon this idea, [2] also indicates that as the number of higher education institutions adopting ERP solutions continues to grow, the percentage of those institutions experiencing difficulty with enterprise-level ERP systems is exceedingly high. Problems associated with enterprise-level ERP systems are largely attributed to limited interoperability, inability to scale, and an overreliance on manual workflow tasks. Consequently, these problems have resulted in diminished data management capabilities and reduced overall system performance among departments of higher education institutions. Likewise, many of the legacy systems that have been developed lack sufficient flexibility, and therefore are unable to keep pace with ongoing changes in academic requirements.

Modern development frameworks and full stack technologies are important to accomplish successfully and to improve the user experience of systems as well. A growing body of research [4] [5] demonstrates that module-based technologies such as React, Node.js, and RESTful APIs have been used as a basis for creating scalable and responsive web applications that can also be utilized in an enterprise environment. Although much has been accomplished, many systems have yet to adopt some of the most advanced features such as role-based customization and fine-grained access controls.

The discussion of how data analytics and artificial intelligence are being integrated into educational systems has been expanded upon in research [6] [7], with predictive models highlighting a range of ways to assist educational institutions to identify performance trends for staff and students, assess potential risks and summarize data for decision-making at various levels. Intelligent systems that are deployed using the above technologies can provide institutions andeducational administrators the opportunity to be proactive in their approach to educational improvement, rather than merely dependent upon information from past events.

Most of the currently existing ERP systems do not incorporate an integrated methodology for combining AI based data analytic findings into the system's role based architecture, according to the above research referenced as [8] and [9]. As a result, existing systems do not provide users with personalized or increased automation across all user roles.

To address these issues and limitations with existing solutions, the proposed system will utilize an integrated role-based access control (RBAC) framework in conjunction with a full stack solution and AI-based structured and unstructured data analytics capabilities. The result will be an integrated, dynamic, centralized database as the foundation of the RBAC framework that can dynamically support multiple modular system designs for each organizational unit combined with intelligent and data-driven decision support. The ultimate goal will be an efficient and scalable system designed to address the organizational needs of educational institutions and the stakeholders within and outside of those institutions

3. EXISTING SYSTEM

In today's higher education landscape, many colleges and universities utilize traditional academic management techniques or partially computerized Enterprise Resource Planning (ERP) applications to administer daily operations. Traditional academic management tends to have many independent modules (i.e., admissions, attendance, exams, timetable, fees, etc.) and these modules are rarely fully integrated; thus the data is managed differently and communication between departments is inefficiently performed.

Many institutions still use partially-automatic processes and simple digital tools (such as spreadsheets or stand-alone applications) for data entry and automation. There is duplicative data, a greater likelihood of human error, and delays in posting and accessing crucial academic information. The lack of real-time data synchronization between departments reduces the overall efficiency of academic operations also.

While newer ERP solutions do exist, they have numerous limitations; these systems are often difficult to scale, have limited flexibility, and are characterized by complicated user interfaces. As the number of users of these systems increases, the ability to manage large volumes of data at the institutional level becomes increasingly difficult due to performance degradation in the system. In addition, these systems are not typically flexible enough to adjust to changes in the academic policy and regulations.

Another critical weakness found in current systems is lack of intelligent decision-making capability. Typically, a platform consists solely of static data storage and reporting features; there are few advanced analytics or predictive insights. Additionally, in many cases role-based access control has not been implemented effectively, or not at all, resulting in serious security issues and poor user experiences.

While basic academic management uses are served through existing systems, the results lack full integration, intelligent operation, and user-friendliness. Therefore, there is an acute need for more sophisticated education technology systems that integrate automation, artificial intelligence, secure role management, and real-time data processing to create greater overall efficiency for education institutions.

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4. PROBLEM DEFINITION

As enrollment and academic activity continue to expand at colleges and universities, it has become evident that the management systems currently being used in higher education institutions are already becoming strained to their limits. Most colleges and universities continue to rely on different software systems and academic operations that do not integrate with each other.

There are still large inconsistencies in data and, therefore, ineffective communication between departments (i.e., & other campuses). In addition, a large majority of schools do not have a central management system, which leads to unnecessary duplication of effort and increases the chances of administrative errors.

One area of difficulty in current systems is the absence of a properly defined Role-Based Access Control (RBAC) structure for system users. Due to the lack of a formalized structure that defines user access privileges and location of user access, all end-users, including students, teachers, accountants, librarians, and job placement officers will have inappropriate access to one or more functions of the system. Therefore, the lack of a formal structure defining user accesses creates risks regarding securing user information, such as compromising privacy and developing inefficient platforms for those users and subsequently reducing the productivity of the system.

In addition existing college management systems will not provide intelligent decision-making. Many systems we currently work with are mainly focused on basic data entry level operations and static reports generation without using any predictive or analytical capabilities. This challenge creates barriers when trying to identify at risk students early on, track gains in attendance, or make timely data-driven (data-informed) decisions.

One other problem identified is that our campus does not experience any real-time data synchronization between departments. Each of our departments use separate tools to manage attendance data; examination scores; fee payments; and placement activities. As a result of having separate tools across these departments, there is no “single version of the truth” for critical academic information or Operation across the campus. Therefore, this has created issues accessing key academic information in an efficient manner, while also working to foster increased transparency into the operation of the institution.

Thus, a Fully integrated, intelligent, and secure ERP system for the entire college is needed to address the above issues through centralized, intuitive, and intelligent data management; enforced role based access security; and AI-driven and analytics-driven cross module integration — this has motivated the creation of the proposed Smart College ERP Management System.

5. PROPOSED SYSTEM

The Smart College ERP System proposal is a fully integrated, intelligent solution to improve upon current academic management systems. The solution utilizes state-of-the-art technologies (e.g., Artificial Intelligence, full stack web development, role-based access control) and data-driven analytics to create a single technology-enhanced, efficient and scalable academic ecosystem.

This system enables all academic and administrative functions, e.g., student information management; attendance tracking; timetable scheduling; exam management; fee processing; and performance monitoring using one unified platform. Unlike existing systems, which use separate isolated modules, it creates a completely integrated intelligent academic system by consolidating all functions associated with the academic institution into one hybrid system.

The most important improvement in this system is the incorporation of Role-Based Access Control (RBAC) whereby access rights and capabilities are assigned to each user according to the role they have been given in the system. This ensures every user can only view and interact with the parts of the system that are relevant to their role, preventing unauthorized access and maintaining data confidentiality. By providing role specific functionality and dashboards to each user, there will be a higher level of data security and the system will become much easier to use on a daily basis, eliminating unnecessary complexity and confusion for all users.

The use of AI (artificial intelligence) enabled predictive analysis is applied to automate processes, and enhance overall decision-making for educational institutions. By analyzing both academic and non-academic (behavioral) data collected through the system, predictive indicators can be provided to educational institutions for predicting student performance at a future time, evaluating risk potential for attendance, and analyzing historical trends for institutional performance. By having access to valuable information, both educators and administrators can make informed and timely decisions to increase student success.

A modern complete stack architecture formed using React for frontend, Node.js & Express for backend, MySQL as relational database is an all-in-one system which gives good performance potential, flexibility and ease of enhancement down the road. In addition, the design provides the ability for future growth in features and functionality (i.e., reporting, etc.) without interfering with currently existing functionality and allows for customization of the overall system.

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As a whole, the AI-enabled Smart College ERP System is a new & creativity-driven ERP solution that will effectively provide education facilities by automating various processes at an institution; allow for better management of data; Increase the ability to make proper & informed decisions through excellent & accurate data available; and, ultimately, give a better user experience (more specifically, provide users with more customized intfomation) than a traditional ERP System..

6. SYSTEM DESIGN

The proposed Smart College ERP Management System uses a modular scalable architecture for effective handling of academic and administrative functions. The School's development methodology is structured in such a way as to ensure clarity, maintainability, and potential expansion into the future. This system uses modern web technologies combined with centralized data management to provide a secure way of meeting all needs quickly, easily and effectively.

6.1 System Architecture

The layered architecture will follow the three-tier concept of Presentation Layer, Application Layer, and Data Layer. This three-layered architecture provides a method of separating out the different functions of a system, which allows for concurrent development/expansion/scalability.

The Presentation Layer is where users are able to interact with the system through a user interface. The Presentation Layer also provides Administrator, Faculty Member, Student, Accountant, Librarian, and Placement Officer with role-based dashboards and functionality for intuitive system access**.**

The Application Layer is the principal processing component that manages business logic, handles requests, authenticates users and provides access rights. It also processes admissions, tracks attendance, processes examinations, manages fees and generates reports. The Application Layer defines APIs that facilitate secure communication between the system's various components.

The Data Layer is implemented as a single centralized database that stores all academic and administrative data. By storing all data in one place, the Data Layer ensures the consistency of all data and the integrity of all data as well as providing for efficient retrieval of all data. The architecture of this system allows for the real-time retrieval of all data in addition to providing for the seamless integration of modules.

This design of the architecture of the system allows for the system to scale, to be flexible, and to perform at a high level all in order to accommodate the changing needs of the institution being served by the system.

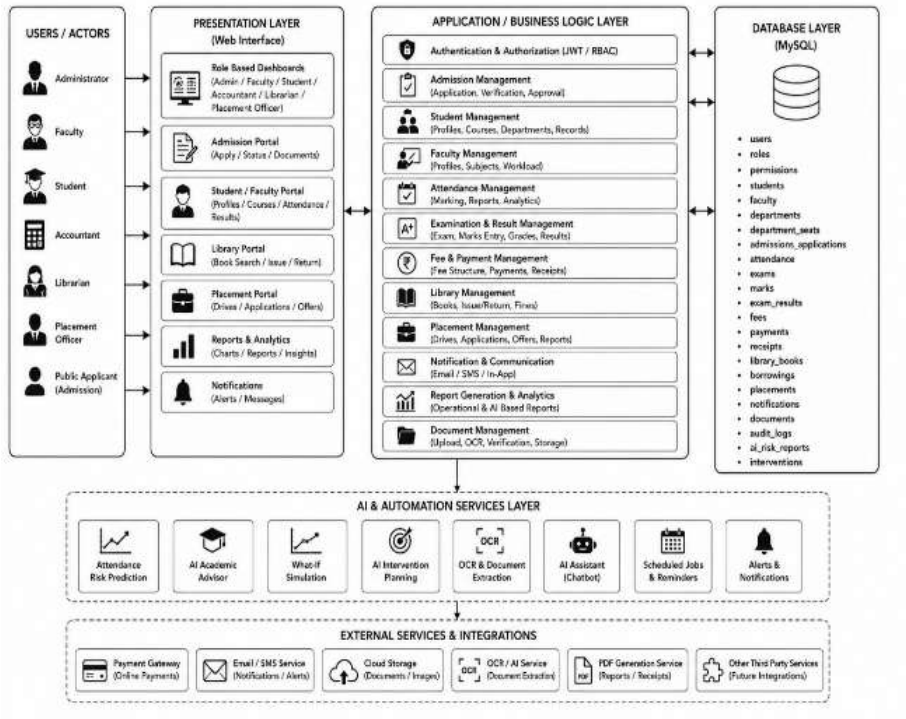


Fig 6.1: System Architecture

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6.2 Technologies Used

Modern full stack technologies will be used to build the new system. These have been intentionally picked so as to create a system that is fast, is able to scale quickly, and is simple to maintain. Each of these technologies will be used due to its ability to address specific system needs as well as offering end users a smooth and consistent experience.

Frontend: The user interface is created using React which allows for the creation of interactive and responsive pages using reusable elements; this makes navigating the system quicker and easier than if all web elements were created from scratch. Users will be able to navigate through different parts of the system without any wait.

Backend: The backend of the system is built with Node.js and the Express framework which enables the system to process many requests in a timely fashion and respond to requests quickly. The Express framework is also useful when designing secure, structured APIs, which connect the frontend and the database.

All academic and administrative data is stored within the database using MySQL. This provides an efficient method of managing significant amounts of information such as student records, attendance, examination, and financial records. MySQL will also maintain accurate and consistent data throughout the whole system.

RESTful APIs are used throughout the system to provide easy communication between different components of the system. This will allow for a seamless flow of data between the front-end and back-end components of the system. The system has also included many AI-based features to provide analytics and provide intelligent assistance, which allows for better decision-making by users and will ultimately increase the overall success of the system.

6.3 Role-based system

There are multiple users of the system and each user is able to see only what the should be viewing based on their role in the system (i.e. role-based access control). This helps the user to work with the system without confusion and allows for system security.

The overall administrator is the person who has the most responsibility for managing the system. The administrator has the ability to create users and maintain users in the system, configure the academic information (i.e. courses and subjects) for the school, and track the events performed within the system. This role has the most privileges and access to all modules (i.e. courses, students, faculty, and system) in order to help the administrator maintain proper control of the system.

Faculty members are primarily responsible for conducting academic activities within their subjects. They have the ability to record attendance, record student grades, and monitor student performance, among other actions. In addition, they can see their assigned subjects and class schedule, which helps them to perform their daily work more effectively.

A student role allows students to access their own academic information. They can check on attendance, grades, course details and how much money they owe for tuition and fees. This means that students can always have the most current information about their academic progress without needing to communicate manually.

The accountant manages all financial transactions in the system. This includes managing student fee payments and tracking payment history. An accountant's role is to ensure that all of the information regarding student fees is accurately recorded.

The librarian is responsible for managing the library portion of the system. To do this, the librarian will maintain a database of books, checking in and out books as well as maintaining current and accurate records relating to late fees, etc., allowing for streamlined operation of the library, thereby making it easier to manage the operations of the library.

Placement Officers are the individuals who manage all placement-related activity such as adding company information, creating job drives and following up on student applications. By doing this, they help keep students informed about placement opportunities and assist employers with their hiring needs.

The role-based design of the placement application allows for an easy-to-use, organized and secure location of the placement system. As a result, our placement application will provide all users with only what they require to complete their tasks efficiently and therefore provide an improved user experience.

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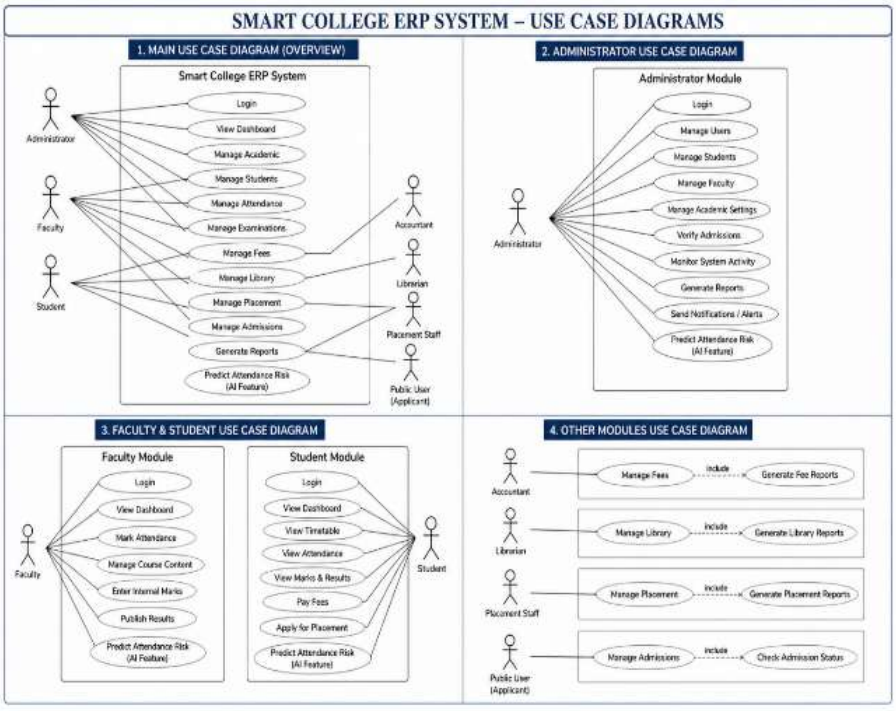


FIG 6.3.1 USE CASE DIAGRAM

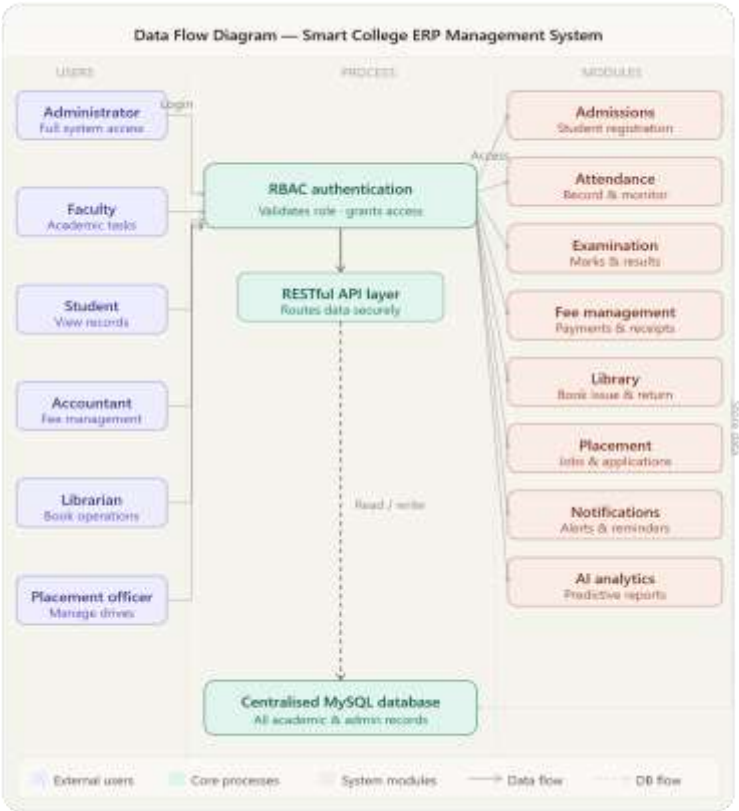


FIG 6.3.2 DATA FLOW DIAGRAM

6.4 Modules

The system has different parts/modules so that each of these parts of the application can do a specific job in an organized way and clearly show what to do. By doing this, the modular format makes it a lot easier to manage, understand, and maintain the system. At the same time, all modules connect to other modules, allowing for a continuous flow of information throughout the system.

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The User Management module will manage all of the user accounts and permissions for login activity. The User Management module manages the secure login of users and the roles that they are assigned and restricts the features available to each user based upon the role they are assigned in the system.

The Student Management module will be used to manage the student information. It will store personal information about the student, their academic records, and all of the courses that the student is enrolled in and keep all student information together in one place.

The Faculty Management module will be used to manage the Faculty member's information, their subjects that they are assigned to teach, and their schedules (teaching responsibilities).

The Course and Subject Management module will be used to define the academic structure of the institution. It will allow for the creation of departments, courses, subjects, and semesters. The Course and Subject Management module will provide the proper academic structure of the institution.

Faculty use the Attendance Management module to keep up with each student's attendance records; this module also assists in determining how many days each student attended class and then shows that information in report format, making it obvious how frequently students participated in class.

The Examination and Result Management module helps to maintain accurate records of all exam-related activities. From setting up exams to recording results, the Examination Management module creates an environment that is conducive to accurate and fair evaluations.

The Fee Management module provides a comprehensive solution for managing all aspects of fee management. It successfully manages student payment records; generates required receipts; tracks outstanding or overdue fees; and provides timely notifications necessary for taking appropriate action regarding fee payments.

The Library Management module offers an easy way to manage daily library operations. It records and tracks book inventory, manages book issue and return processes, and calculates fines for overdue returns. All of this contributes to a more effective library management system.

The Placement Management module is focused exclusively on managing the placement process for students. It allows for company profiles to be created, provides for the creation of job postings by companies and keeps track of all applications submitted by students. Thus, through this module, both students and future employers have access to meaningful information about job placement opportunities.

Finally, the Notification and Communication module serves as a key element in ensuring that all users stay informed. It allows all users to receive timely notifications both regarding exam schedules and as it relates to fees, events, and other important activities. This ensures that every user (student, faculty, or staff) receives the information that they need from the system in a timely manner, minimizing any potential confusion in communication.

A report is generated which calculates overall system performance through attendance, learning outcomes, fee collection and other related information. Administrators will find value in using these reports and the data provided as a basis for making sound and confident decisions as aresult.

The overall structure of the system is designed as a modular entity which can operate independently, while also maintaining a connection to other parts of the system. This design allows for the integration of all modules, thus allowing administrators to efficiently manage all aspects of day-to-day operations and ultimately result in all components being properly and successfully executed.

7. SYSTEM IMPLEMENTATION

Smart College ERP System is focusing on providing a functional, academic, and administrative ERP solution with a real-time focus between its various components. This is accomplished using a full stack development method where the unit interfaces (front end, back end, and database) are bound with formalized APIs and workflows.

From a users point of view, the Smart College ERP System starts with a user login at the front end. Users include administrators, faculty, students, and other staff and, once they log in with their credentials, users are directed to their respective dashboards based on their user role. Each respective dashboard will provide access to features the users can use to perform tasks.

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The Smart College ERP System uses RESTful APIs to communicate between the front end of the unit and the back end of the unit. An example of user communication is when a user submits an admission form, marks attendance, or applies for placement, a user initiated request is sent to the back end of the unit via an API. The back end of the unit processes the request, applies the appropriate business logic, and interacts with the database to store or retrieve the required data. After the request is processed, a response is sent back from the back end of the unit to the user interface and will be displayed.

The database is critical in maintaining and organizing all of the systems' data. It will contain records pertaining to users, students, faculty members, classes, attendance, examinations, fees, library transactions, and placement activities. By creating appropriate relationships between the various tables, the data can be manipulated or accessed with consistency. In conclusion, the implementation of the system provides an effective means of providing seamless interaction throughout all components, made possible through efficient processing of data, secure access to data, and availability of real-time updates. The end result is that the system is reliable, upgradable, and provides the capability of adequately managing the large complexities associated with both academic and administrative operations.

8. RESULTS AND DISCUSSION

Module	Role	Key Functions	Execution	Outcome
Admission	Admin / Student	Application, verification, confirmation	Completed	Smooth workflow
Attendance	Faculty	Marking, tracking	Completed	Accurate records
Examination	Faculty / Student	Marks entry, result generation	Completed	Automated results
Fee Management	Accountant	Payments, receipts, tracking	Completed	Reduced errors
Library	Librarian	Books, issue/return, fines	Completed	Organized system
Placement	Officer / Student	Drives, applications	Completed	Easy tracking
Notification	All Users	Alerts, updates	Completed	Better communication
Reports & Analytics	Admin	Reports, insights	Completed	Better decisions
AI Assistant	All Users	Chat queries, task execution	Completed	Faster interaction
AI Risk Analysis	Admin / Faculty	Student risk prediction	Completed	Early identification
AI Report Generator	Admin	Auto report generation	Completed	Saves time

The results obtained from the implementation of the Smart College ERP System indicate that it is able to successfully manage both academic and administrative functions at a college or university. Each module has been tested with various scenarios, and they have all demonstrated stability, accuracy in data processing, and effective communication between all modules after implementation.The sections below summarize some of the important results obtained from the proposed Smart College ERP System.

8.1 Functional Implementation of Modules

The following core modules have been fully implemented and are operating as intended: Admissions, Attendance, Examinations, Fee Management, Library and Placement.

The Admissions module improves the process of registering students and verifying their eligibility for admission.

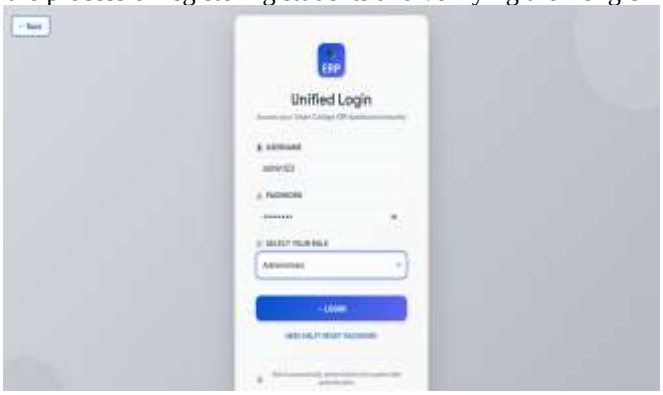


FIG 8.1.1 RBAC BASED ACESS PAGE

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FIG 8.1.2 ADMIN DASHBOARD

The Attendance module enables faculty to easily record and monitor students' presence in class (thereby reducing error);

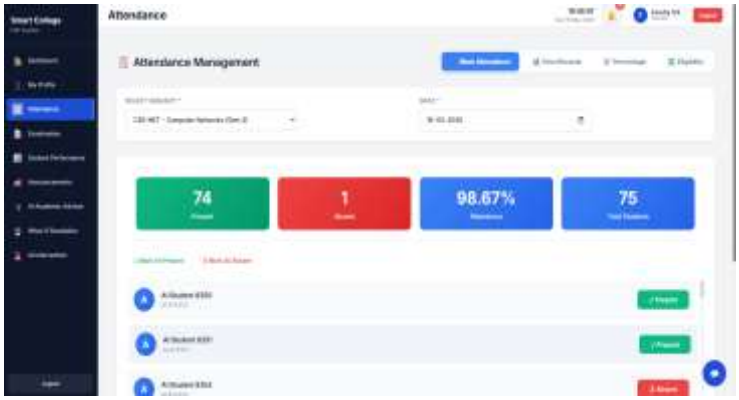


FIG 8.1.3 ATTENDANCE MARKING

The Examinations module automates the entry of marks for courses (which reduces the possibility of errors in entry) and generates results for all subjects automatically after the examination process is complete.

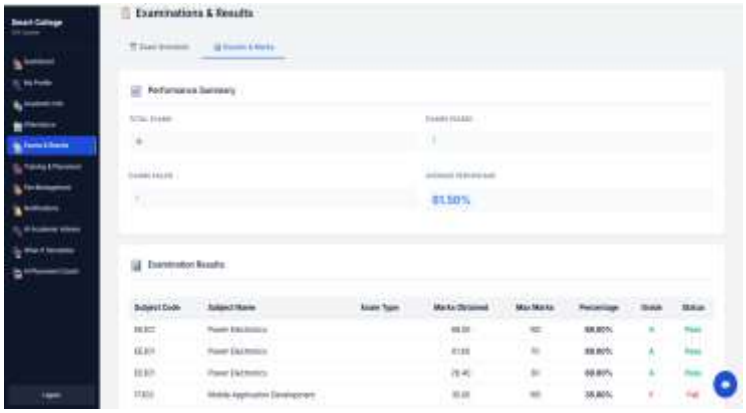


FIG 8.1.4 RESULT SCREEN

Similarly, the Fee Management module provides an accurate system for tracking student payments; generates accurate receipts of payments; and provides timely reporting of any discrepancies between student accounts and the payment records maintained by the Student Accounting Office.

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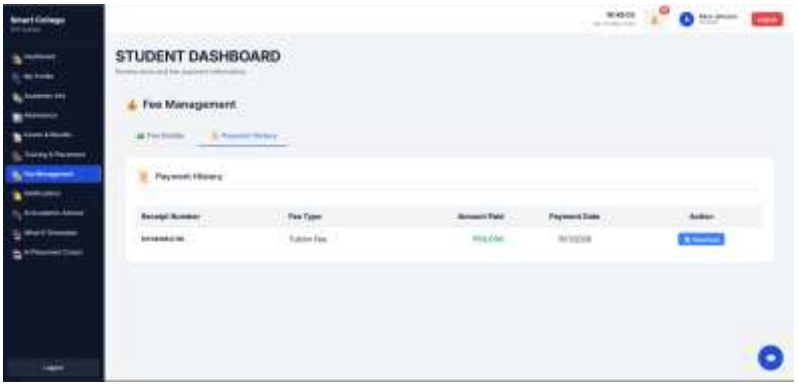


FIG 8.1.5 FEE MANAGEMENT

The Library module supports the organization of book information and establishes procedures for using and returning books using a single system.

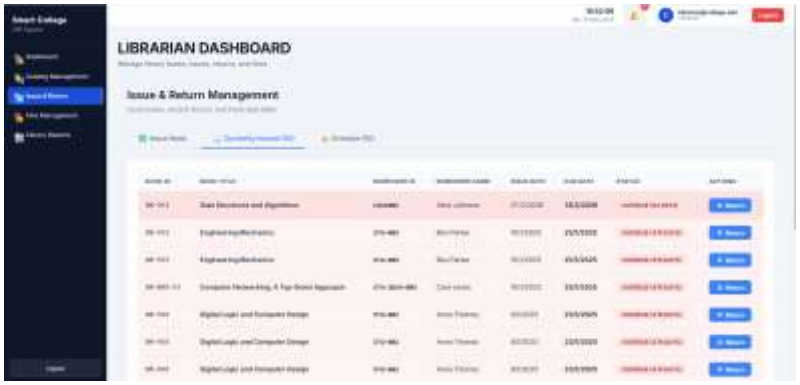


FIG 8.1.6 BOOK ISSUE AND RETURN

The Placement module supports recruitment activities between employers and students by managing recruiting drives within each institution (first), while also managing student applications for job placement (second).

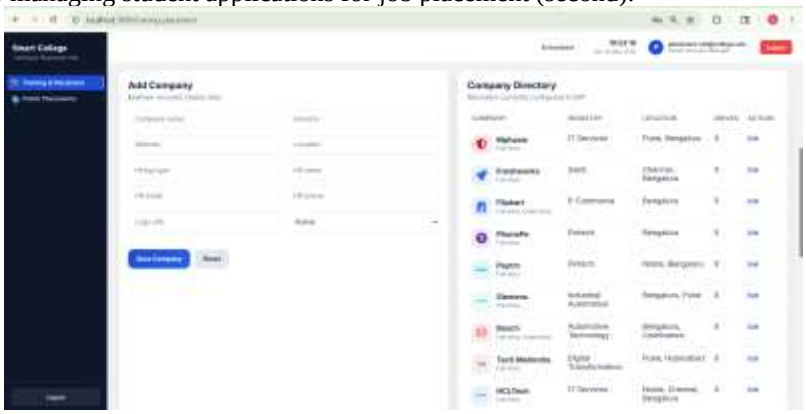


FIG 8.1.7 PLACEMENT MODULE

Thus, all core modules interact seamlessly within the overall system to facilitate an integrated workflow through in-use functionality..

8.2 Performance and Effectiveness

Utilising this system is far superior to conventional methods from both a performance and effectiveness perspective. Attendance calculations, results processing, and report generation were previously performed manually, but as these functions have now been automated, there will be significant improvements in efficiency, and human error will be reduced.

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System comparison

Feature	Traditional system	Proposed ERP system
Data management	Fragmented across systems	Centralised database
Access control	No role-based control	Full RBAC for all users
AI and analytics	None	Decision tree + random forest
Module integration	Isolated modules	Fully integrated modules
Real-time sync	No real-time updates	Real-time across all modules
Student risk detection	Manual review only	Automated AI flagging
Report generation	Manual and time-consuming	Automated AI reports
Scalability	Limited and inflexible	Modular and scalable

Proposed system labor feature comparison — Traditional vs Smart College ERP System

Table 1: Comparison between Traditional Systems and the Proposed Smart College ERP System

With all of an organisation's information being stored in a centralised database, it will now be available to users much more quickly at any time, therefore providing much better service to them when they are requesting information. The overall efficiency of the institution has therefore significantly improved as a result of this automation and technology being fully integrated.

8.3 Role Based Access and Security

Implementing role based access control to the system, so that only users that should have access to specific functionalities can gain access to those functions, will significantly improve security within the system. Administrators will have access to everything within the system, while faculty members, students, and other staff will only have access to specific functionality, depending on their roles within the organisation.

Not only will users be restricted from being able to access certain functions within the system, but they will also have their security improved by using role-based access control.

8.4 The Effects of Artificial Intelligence on Functionality

AI technology provides numerous advantages to enhance the overall user experience and level of interactivity (functionality) of the system. The AI Assistant will help users obtain their required information quickly without going through many directories; simply ask the assistant or do a search, and the requested information will be provided immediately, thereby eliminating idle time.

Using AI-based technologies will provide greater identification of students in danger of failing academically by using patterns such as frequent absences or poor grades. From this, the system can identify students who may need additional academic support. This way, faculty and administrators have the ability to identify these students at the earliest opportunity to provide timely support rather than only responding after they are in trouble.

AI Report Generation will automatically generate reports as needed. A Decision Tree Classification algorithm predicts the academic performance of students through three primary methodical parameters which influence how well a student may perform. These three methodical parameters are attendance percentage, as well as, score on internal assessments and percentage of submissions of assigned coursework. The use of the aforementioned methodical parameters will allow the system of monitoring the academic progress of students through a system that will automatically flag students as at-risk if their attendance falls below 75% and/or their scores for assessments are less than 50%. When a student is flagged as at-risk, the system will automatically notify the concerned instructor through the built-in notification module. In addition to the above methods of monitoring a student's performance, a second analysis model — a Random Forest model — is employed to evaluate historical attendance and performance each department to allow administrators to develop predictive reports without the need to perform any activity manually. These predictive reports developed through predictive analytics (i.e., random forest) will allow faculty and administrators to identify students who would benefit from timely academic intervention — and will allow the school to proactively identify and support students with their academic performance rather than reactively supporting students with their academic performance.Instead of manually creating reports, the system will automatically create reports in a quick and accurate manner. Not only does this improve the functionality of the system through added intelligence, but it also will assist users in making better decisions and/or carrying out their jobs more efficiently through assistance with good time management.

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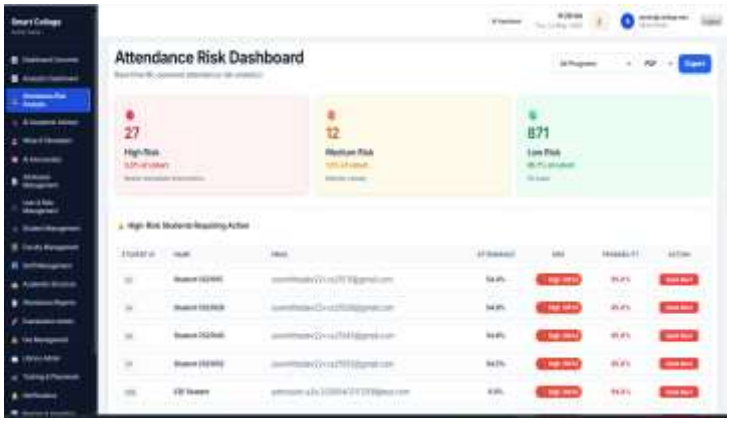


FIG 8.4.1 STUDENT RISK PREDICTION



FIG 8.4.2 AI REPORT GENERATION

8.5 Advantages and Results of the System

The system provides a myriad of practical advantages for all users. For example, by simplifying the tracking of activities, management is made possible for administrators to manage institutions more efficiently. In addition, faculty can complete academic tasks more simply and students can access their academic information such as attendance, grades, and fees.

Another advantage is that communication has been enhanced. Users are able to receive important information including updates, announcements and reminders through the system so that they are kept up to date without any further loss. The system provides a way for all data to be maintained in a structured manner, resulting in less duplication of effort and greater accuracy.

As a final note, the system simplifies work, improves speed and improves reliability. By providing a means for time savings, decreasing the rate of errors, and improving management overall.

8.6 Discussion

The findings indicate that this new system has addressed many of the issues experienced by traditional systems. Most tasks used to require physical labor and take considerable time to complete; however, this process has now been significantly simplified and automated.

The system places all activities in one location, allowing for easier manageability of activities and easier access to data. The role-based access and the integration of AI into the system provide users with added value through improved trustworthiness and the capability to be utilized more effectively.

In other words, this new system not only provides institutions with more efficient processes but also creates a better experience for individuals who use these institutions or businesses. Finally, the system has allowed businesses and institutions to conduct their daily business operations as well as future business operations more systematically and with greater ease than before.

9. CONCLUSION AND FUTURE ENHANCEMENT

In summary, Smart College ERP System helps make Academic & Non-academic operations easier and more organized on a daily basis by easily compiling all the activities (Admission, Attendance, Examinations, Fees, Library, Placements) into one system

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instead of having to use separate systems for each operation. By aggregating all these activities into a single system, this will provide the opportunity to save time and reduce the chances of making a mistake in creating records.

Smart College ERP System also has a clear advantage of reducing manual effort for multiple administrative functions (e.g., calculating attendance, generating results, maintaining records). All functions that previously required manual effort are now performed using the system, allowing these functions to be performed much quicker than previously possible and with a much lower chance of making a mistake. Having all student and administrative data saved in one place enhances the capability to manage and access that information as required.

Finally, the role-based functionality also enhances clarity and improves security in the use of the Smart College ERP System because each user is provided access to only the modules that apply to their function, which eliminates unnecessary confusion and removes barriers to ease of use.

AI features are another critical component that contributes to a system's overall success by creating a more user-friendly and interactive experience. Users have access to an AI assistant, providing quick access to information, and identifying students for additional support. Automated report generation also saves time and improves efficiency. These attributes serve to create a smarter and more viable system in real-world applications.

Although the system functions effectively, enhancement opportunities are present. With time, more sophisticated features can be implemented into the system. The potential exists to expand into mobile application form so that users can access systems from any location. More advanced AI features could provide personalized recommendations based upon prior history of user performance to benefit overall system usage.

In general, the system is an excellent foundation for better management of a variety of institutional activities. With continued improvements, it has the potential to be much stronger, more flexible, and more valuable for the needs of education in the future.

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