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PIC STUDENT ENROLLMENT DASHBOARD

Yuvarajan N[1], Veerakumar T[2], Amsath Kumar S[3], Tejaswin D[4], Muthumeena S[5]

[1]*Student, Dept. of Information Science and Engineering, Anna University, IN*
[2]*Student, Dept. of Mechanical Engineering, Anna University, IN*
[3]*Student, Dept. of Information Science and Engineering, Anna University, IN*
[4]*Student, Dept. of Information Science and Engineering, Anna University, IN*
[5]*Professor, Dept. of Information Technology, Anna University, IN*

Abstract - *The Product Innovation Center (PIC) is responsible for managing student enrolment, lab changes, and event registrations, which are crucial for skill enhancement. Currently, these processes rely on manual tracking through spreadsheets, leading to inefficiencies, delays, and communication gaps. The PIC Student Enrolment Dashboard addresses these issues by providing an automated, centralized system with real-time updates, notifications, and analytics. This system enhances operational transparency and efficiency, ensuring seamless interactions among students, faculty, and administrators. The proposed dashboard includes role-based access control, real-time notifications, and a structured workflow for student enrolment, lab changes, and event participation.*

Key Words: *Student enrolment, automation, role-based access, event registration, lab management, real-time notifications.*

1. Introduction

The Product Innovation Center (PIC) facilitates student participation in various labs and events to enhance their practical skills. However, the current manual processes for student enrollment, lab changes, and event registrations result in inefficiencies, delays, and communication gaps. The reliance on spreadsheets and traditional record-keeping methods makes these processes prone to errors, leading to discrepancies in student records and difficulties in tracking participation. Faculty members struggle to manage interview schedules and event participation efficiently, as notifications are often informal and lack consistency. Additionally, administrators face challenges in generating insightful reports due to the absence of an integrated reporting system. This project aims to develop an automated system that digitizes and centralizes student enrollment, lab changes, and event registrations, eliminating delays, reducing human errors, and streamlining communication between students, faculty, and administrators. By improving data accuracy and accessibility, the system will enable better decision-making and foster a more organized, transparent, and efficient academic environment.

1.1. Background of the Work

Traditional student enrolment and event registration workflows have long been manual, time-consuming, and error-prone. Historically, institutions managed enrolments using physical documentation and spreadsheets, requiring students to submit applications manually and wait for approvals through disconnected communication channels. This process, while functional in the past, has become increasingly inefficient as the number of students and academic events grows. The lack of automation results in slow decision-making, lost records, and errors in data entry.

In conventional workflows, faculty members manually review student applications for labs and events, often relying on email-based communication for approvals and updates. The absence of an integrated system means that decisions frequently involve back-and-forth correspondence, leading to delays in finalizing enrolments. Any miscommunication or failure to track pending applications can result in students missing out on important opportunities. Additionally, since reports are generated manually, administrators find it difficult to analyze student participation trends and assess skill development accurately.

With the increasing demand for efficient academic management, institutions are shifting towards automation. Digital transformation ensures a structured and efficient approach to enrolment and event registration, reducing human intervention while improving accuracy, speed, and collaboration among stakeholders. By integrating a centralized digital platform, real-time validation tools, and automated approval workflows, the transition from manual processes to a smart enrolment system can be streamlined, resulting in improved efficiency and reduced administrative overhead. Moreover, advancements in cloud computing, role-based access control, and notification systems offer new opportunities for optimizing academic workflows. Automated verification processes can now instantly assess student eligibility, ensuring compliance with institution-defined criteria before approvals. A structured approval system enables faster decision-making, while real-time tracking enhances transparency in student enrolments and event participation. These innovations not only improve operational

efficiency but also enhance communication and coordination between students, faculty, and administrators.

As institutions continue to expand their student base and academic offerings, the necessity of an automated enrolment workflow has never been greater. By leveraging digital transformation, academic organizations can significantly enhance their ability to manage student participation effectively while reducing manual workload and improving overall efficiency. This project explores the design, development, and implementation of an automated student enrolment and event registration system, demonstrating how digital solutions can revolutionize traditional academic workflows and set new standards for efficiency and reliability in student management.

2. Motivation and Scope of the Proposed Work

The conventional student enrolment and event registration process is riddled with numerous challenges that hinder efficiency and accuracy. One of the most pressing issues is the high susceptibility to human error during student application verification and approval. These errors frequently result in incorrect enrolments, misplaced applications, or unnecessary delays, which can cause students to miss crucial academic opportunities. Additionally, the approval process is often lengthy, as faculty members, administrators, and event coordinators manually review applications and eligibility, leading to bottlenecks in processing student enrolments and registrations.

Another major concern is the lack of real-time monitoring, which exacerbates delays and miscommunication among stakeholders. Without a centralized tracking system, students are often unaware of their enrolment status, and faculty members struggle to coordinate interview schedules and registration deadlines efficiently. Disjointed communication methods, such as email threads or verbal confirmations, further contribute to inefficiencies, as important updates are often lost or overlooked. Moreover, the absence of an automated system for managing and monitoring student participation in events and labs complicates record-keeping, making it difficult for institutions to maintain traceability and accountability in student engagements.

By implementing an automated and centralized student enrolment dashboard, these challenges can be mitigated effectively. The proposed system will provide real-time status updates, automated approval workflows, and structured notifications to ensure smooth coordination between students, faculty, and administrators. By eliminating redundant manual processes, reducing approval delays, and integrating a robust tracking system, the PIC Student Enrolment Dashboard will significantly enhance efficiency, transparency, and overall academic experience for all stakeholders involved.

3. Proposed Automated Workflow System

The primary objective of the proposed system is to automate workflows for student enrolment, lab changes, and event registrations, thereby improving efficiency and reducing administrative burdens. The system aims to provide a centralized portal that offers dashboards tailored to students, faculty, and administrators, ensuring that each user has access to relevant information and functionalities. By implementing role-based access control, the system enhances security and prevents unauthorized modifications to student records. Furthermore, the system integrates robust notification mechanisms, ensuring that all stakeholders receive real-time alerts regarding interview schedules, enrolment updates, and event participation statuses. Another key goal is to simplify reporting by generating automated insights into student performance and participation trends, allowing faculty and administrators to make data-driven decisions.

4. Full-Stack System Architecture

The proposed system is built using a modern full-stack development approach, ensuring seamless interaction between users, the approval process, and the entire enrolment workflow. The frontend is developed using React.js, providing a highly interactive and responsive user interface that enhances user experience. Tailwind CSS is utilized for efficient and modern styling, ensuring a clean and consistent design across all screens. For effective state management, Redux is integrated, optimizing data handling and improving the performance of the system by reducing unnecessary re-renders.

The backend is implemented using Node.js, which offers a robust, scalable, and event-driven environment for handling multiple user requests efficiently. Express.js serves as the framework for building RESTful APIs, ensuring smooth communication between the frontend and the backend. Authentication and authorization are enforced using JSON Web Tokens (JWT), which regulate user access and protect sensitive data. Data validation and integrity are maintained using middleware such as Joi or Express Validator, ensuring that only valid information is processed within the system.

The database layer is structured using Excel as the primary storage system, allowing seamless integration with existing records while supporting easy data retrieval and manipulation. Since Excel is widely used within the institution, the system ensures that administrative staff and faculty members can access and update records without additional training. The database interactions are optimized for performance using caching mechanisms and indexing strategies, improving query execution time and reducing latency.

The system also incorporates notification services that send automated email and in-app alerts regarding enrolment updates, interview schedules, and event registrations. Additionally, data visualization tools are integrated into the dashboard to provide faculty and administrators with meaningful insights into student performance and event participation trends. The modular and scalable architecture of the system ensures that future enhancements, such as AI-based student recommendations or predictive analytics, can be seamlessly incorporated without major architectural changes.

5. Implementation Details

The system implementation is structured around efficient software development practices. The frontend is developed using React.js and styled with Tailwind CSS to ensure a modern and responsive interface. The backend, built with Spring Boot, manages business logic and data transactions securely. MySQL serves as the database, with a relational schema designed to optimize data integrity and retrieval performance. Security is a priority, with JWT authentication ensuring role-based access control. Notifications are handled through automated email alerts and in-app messaging. The system is deployed on AWS, leveraging cloud infrastructure for scalability and reliability. Continuous Integration and Continuous Deployment (CI/CD) pipelines are integrated to facilitate seamless updates and maintenance.

5.1. Workflow Automation Process

The entire workflow of the system is automated to eliminate manual bottlenecks. The student enrollment process begins with students submitting their preferred lab choices via the web portal. Faculty members are automatically notified of student preferences and proceed to schedule interviews. The system logs all interview schedules and sends automated email notifications to students with details of their upcoming interviews. Once the interview is conducted, faculty update the student's results in the system, which then automatically determines whether the student moves to the next preferred lab or is successfully enrolled. This automation ensures real-time updates and reduces manual intervention.

For lab change requests, students can submit their requests through the dashboard, providing a justification for the change. Faculty members of both the current and requested labs receive automatic notifications and can schedule interviews if necessary. The system records all interactions and updates the status of the request accordingly. If approved, the system updates the student's lab allocation and notifies all relevant stakeholders.

Event registration is also automated. Students can browse available events on the dashboard, with filters for eligibility, date, and faculty approval requirements. The system automatically verifies eligibility based on predefined criteria, such as academic performance and prior participation history. Upon successful registration, students receive confirmation notifications, and faculty can track participation through their dashboards. If an event requires an interview or review process, the system facilitates faculty scheduling and updates student records accordingly.

5.2. Cloud – Based Deployment

To enhance scalability, availability, and performance, the system leverages cloud computing practices. The frontend is hosted on platforms such as Vercel or Netlify, ensuring high-speed access and a smooth user experience. The backend services are deployed on AWS, DigitalOcean, or Heroku, providing robust and secure server management. The MySQL database is hosted on a cloud-based platform to ensure high availability and real-time data synchronization.

6. Benefits of the Automated PCB Workflow System

The PIC Student Enrolment Dashboard provides several significant benefits. By automating workflows, it eliminates manual tracking, reducing administrative workload and processing times. The system enhances accuracy by minimizing human errors in enrolment records, lab assignments, and event registrations. Improved transparency ensures that students, faculty, and administrators receive timely updates, reducing confusion and miscommunication.

Furthermore, the system's scalability allows for the addition of new features and expansion to accommodate a growing number of students and faculty members. The centralized reporting and analytics module enables better decision-making by providing insights into student participation and performance trends.

7. Conclusion

The PIC Student Enrolment Dashboard revolutionizes student enrolment, lab assignments, and event participation by introducing an automated and centralized system. The system addresses existing inefficiencies by eliminating manual processes and providing real-time updates, ensuring a seamless experience for students, faculty, and administrators. Future enhancements may include AI-driven recommendations for lab selection, predictive analytics for student performance assessment, and mobile app integration to extend accessibility. By embracing digital transformation, the system sets a new standard for efficiency and transparency in student enrolment and event management.

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