EDUGENIUS - AI-Powered Smart Learning Management System

Mrs. V. Sivasakthi M. E[1], S. Balakandan[2], S. Dhinesh[3]

Assistant Professor, Department of Information Technology[1]
Students, Department of Information Technology[2,3]
Anjalai Ammal Mahalingam Engineering College, Kovilvenni, Tamilnadu, India
vsivasakthi.aamec@gmail.com, balakandan50@gmail.com, dhineshs520@gmail.com

Abstract: *The project presents a modern, A-Integrated Learning Management System (LMS) designed to streamline educational administration and increase student results through intelligent insights. The system has OTP-based certification and profile photo upload functionality, which ensures safe and role-based access to teachers and students. Administrators can register users, assign themes, and monitor the overall system activity, while teachers can predict students' future attendance and are provided with controlled access to their prescribed subjects, they are only able to manage marks and attendance. Students can independently track their educational progress, obtain personal performance reactions, and reach AI-operated devices for career guidance and dropout risk analysis. AI modules use educational data such as marks and appearance to predict potential risks and recommend the appropriate career path aligned with a student's strength. By offering data-supported insights, the system helps teachers make informed decisions about intervention strategies and support services. In addition, the platform promotes transparency by empowering students to monitor their learning journey in real time. Manufactured with modern techniques such as spring boot and angular, LMS ensures a responsive user experience with secure, scalable backend support. Overall, the proposed system aims to promote institutional efficiency, promote data-powered educational practices, and to provide each student to give more personal and prepared learning experiences.*

Keywords: Learning Management System

I. INTRODUCTION

Changes towards digital education require the adoption of scalable and smart Learning Management Systems (LMS). A modern LMS should not only act as a digital classroom but also provide intelligent support tools for educational tracking, performance analysis, and career planning. With the rise of AI and data analytics, educational institutions are increasingly turning to systems that can personalize learning, allow students to monitor their progress, and predict educational risks such as dropouts. Our proposed LMS is designed as a role-based platform catering to administrators, teachers, and students, ensuring secure and personalized access to educational resources. The system supports digital attendance marking, marks entry, and AI-based insights such as career guidance and dropout prediction. This integration of AI not only makes the system reactive but also proactive in assisting both teachers and learners. It also includes smart performance feedback systems that help students improve their academic performance. The platform improves transparency by allowing students to track their educational development continuously. LMS promotes a more attractive and informed learning environment by combining a user-friendly interface with future-oriented intelligence. Additionally, the system ensures role-based data protection, supports real-time academic data visualization, and facilitates early identification of students needing additional academic support, making it a comprehensive tool for modern education.

II. LITERATURE SURVEY

1. AI-DRIVEN CAREER PATH RECOMMENDATIONS FOR STUDENTS,
Robert White, Lily Chen (IEEE, 2022).

This paper explores natural language processing (NLP) to extract skills and match students to career paths. It enhances the ability of educational systems to offer custom-tailored job recommendations, though it falls short in evaluating soft skills which are essential in many career paths.

2. AI-POWERED LEARNING MANAGEMENT SYSTEM FOR PERSONALIZED EDUCATION,
John Doe, Jane Smith (IEEE, 2023).

This work implements a machine learning-based student behavior analysis to enhance personalization in digital education platforms. The system increases student engagement through tailored experiences but lacks a real-time feedback mechanism, which could reduce the responsiveness of the system to changing student needs**.**

3. AUTOMATED ATTENDANCE & PERFORMANCE TRACKING USING AI,
Michael Green, Sophia Lee (IEEE, 2023).

This study integrates computer vision and deep learning to streamline attendance marking and performance analysis. The system significantly reduces manual workload for teachers but raises privacy concerns due to its reliance on facial recognition technology.

4. PREDICTIVE ANALYTICS IN EDUCATION: AI FOR EARLY DROPOUT DETECTION,
Ahmed Raza, Emily Johnson (IEEE, 2024).

Using decision trees and neural networks, this study addresses the rising concern of academic dropout rates. It offers proactive solutions for institutions to intervene early. However, it is heavily reliant on historical data, which may not adapt well to new patterns in student behavior.

5. ENHANCING LMS EFFICIENCY WITH CHATBOTS FOR STUDENT SUPPORT,
David Brown, Sara Williams (IEEE, 2024).

Focused on real-time assistance, this approach integrates AI chatbots into LMS platforms to resolve queries and boost engagement. While it increases system usability, it still cannot replicate the empathy and understanding provided by human mentors.

III. PROPOSED SYSTEM

This work introduces an AI-integrated LMS that offers real-time academic monitoring, student guidance, and predictive insights.

The system supports digital attendance and marks entry, accessible by students and teachers through dedicated dashboards.

AI-powered modules include:

- Dropout Risk Prediction: Identifies at-risk students early for timely support.
- Career Guidance: Suggests suitable career paths or courses based on academic patterns.
- Predictive Analytics: Analyses attendance and marks to forecast performance trends.
- Performance Feedback: Provides students with data-driven suggestions for improvement based on academic trends.
- Predict Future Attendance: Analyses the historical attendance data and forecast future attendance

Developed using Spring Boot and Angular, the system ensures secure data handling through JWT-based authentication and angular

Route guards for the specific access.

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DOI: 10.48175/IJARSCT-25817

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ISSN
2581-9429
IJARSCT

IV. DEMERITS IN EXISTING SYSTEM

- Attendance errors are frequent due to manual processes.
- Teachers and parents are unaware of problems until results are published.
- Lack of real-time insights delays decision-making for academic support.
- No integration of AI leads to missed opportunities for early intervention.
- System does not scale efficiently for large student populations.

Proposed work

This system introduces an **AI-enabled Learning Management System (LMS)** that automates attendance and academic performance tracking for improved accuracy and accessibility.

It integrates **predictive analytics and career guidance** modules powered by AI to help students plan their future and enable teachers to identify potential academic risks.

The platform provides students with real-time access to their academic data, along with AI-generated feedback and performance insights, supporting transparent progress monitoring and personalized learning strategies.

This system includes the future attendance prediction, which analyzes past attendance data to forecast the future attendance trends.

V. SYSTEM ARCHITECTURE
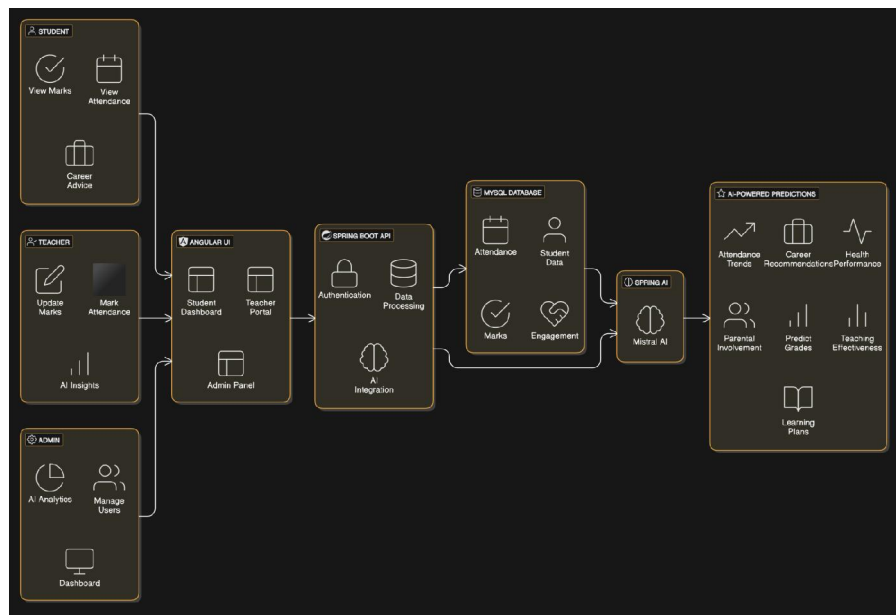
Figure 5.1 System Architecture

System Architecture consists of a role-based AI-Integrated Learning Management System (LMS) consisting of students, teachers, and administrator modules. Students can see the points, appearance and obtain career advice, while teachers can update, mark, reach appearance and AI insights. The

angular UI spring boot acts as a front-end interface connecting APIs, which handles authentication, data processing and AI integration. All academic data - Attendance, Mark, and Engagement - are stored in a centralized MySQL database. This data is processed using the Mistral AI model by Spring AI, which produces the dropout risk, career recommendations, predict future attendance and learning plans such as future insight. The administrator panel enables user management and analytics. The system ensures real-time response to parents and teachers, deciding and increases the student results.

VI. MODULES

Module 1: Admin Module

The administrator acts as a central control unit for module user and subject management. Administrators are authorized to register new users - including both teachers and students - promoting safe onboarding through OTP verification and uploading profile image. Module allows admins to assign specific subjects to teachers, streamlining the subject-wise accountability. It also enables monitoring of system-wide metrics such as user activity, appearance trends and educational performance summary, offering a wide observation through a dedicated angular-based administrator dashboard. All data operations are safe through spring boot API, which ensure strong access control and integrity.
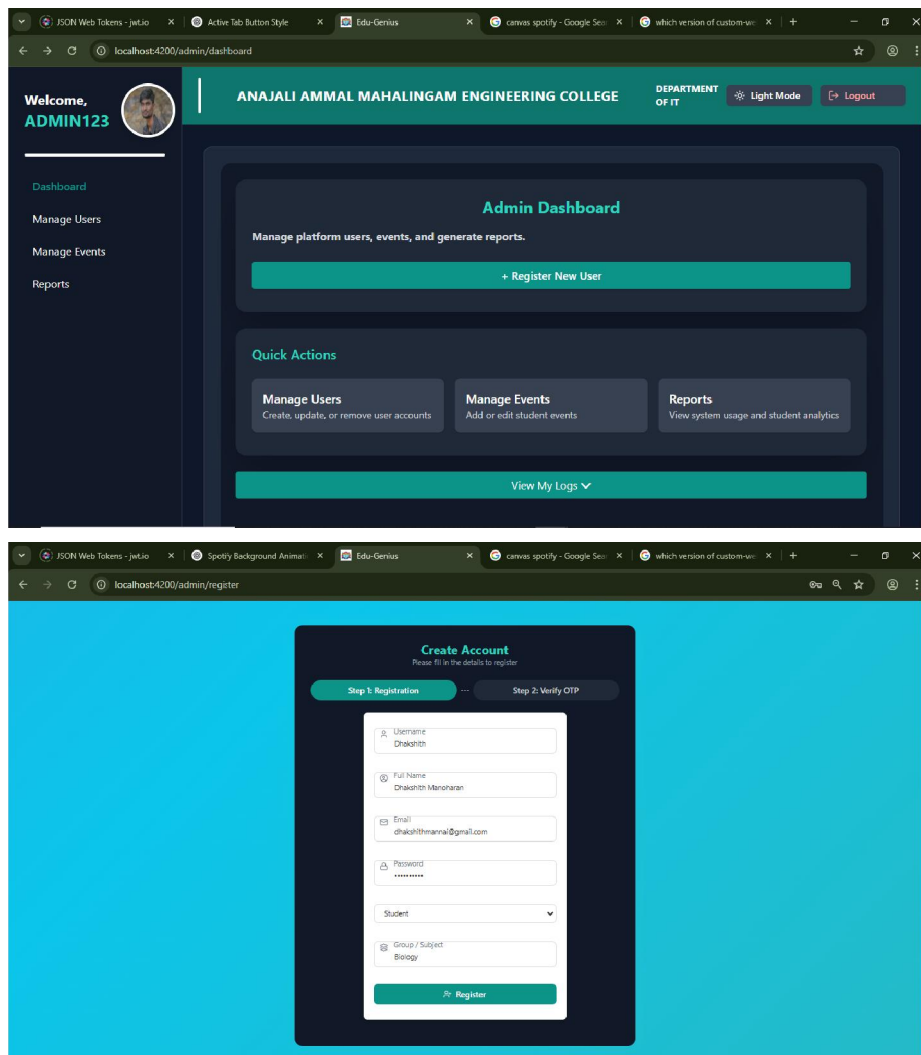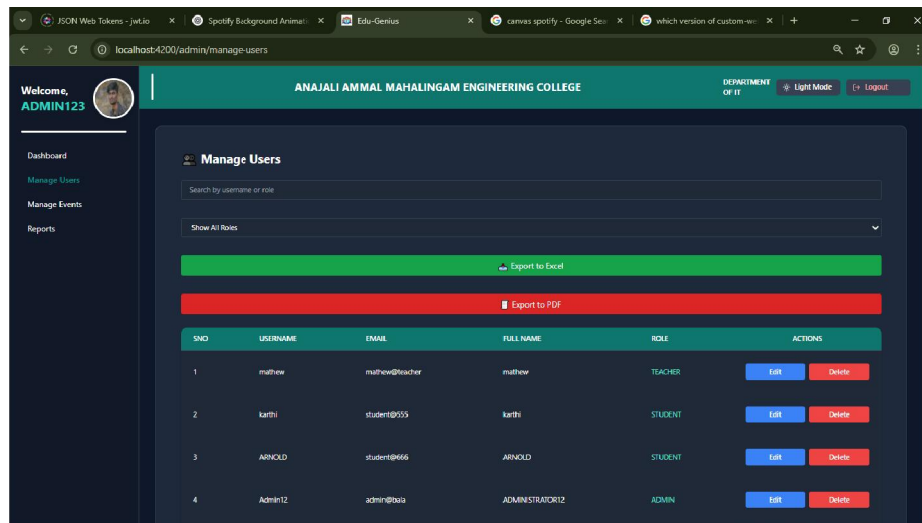
Module 2: Teacher Module

The teacher module is ready to empower teachers with equipment to efficiently manage its educational responsibilities. Teachers can see a list of students enrolled under their prescribed subjects, reach the previous attendance record, and update the current appearance or scar through interactive angular forms. Also, Teachers can view the drop out prediction as well as future attendance prediction for the specific student by mentioning their id. Access is strictly scoped - teachers can only interact with subjects that they are assigned by the administrator. Backend applies this role-subject to mapping through safe APIs, ensuring data privacy and authority. The module basically integrates with appearance and markings to maintain structured and accurate academic records
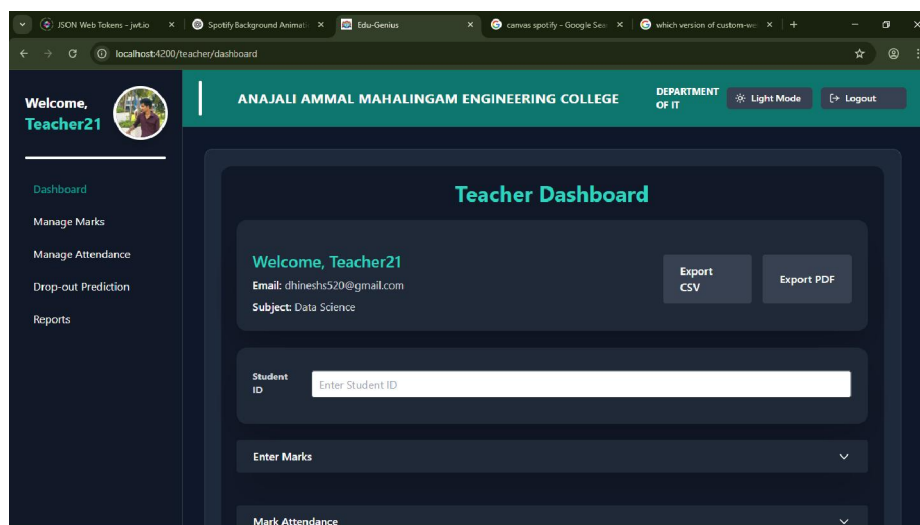

Module 3: Student Module

This module provides an individual learning experience for each student by allowing access to its own appearance log and academic score. Students can receive AI-borne response based on their performance, including suggestions for correction. A major attraction is the integration of the AI-operated career guidance and dropout risk analysis tools. Students can interact with these intelligent features through the user-friendly dashboard, obtain career path

recommendations and real -time alerts about educational risk. All interactions are safely handled through REST API, in which data focuses a strong focus on privacy and role-based visibility.
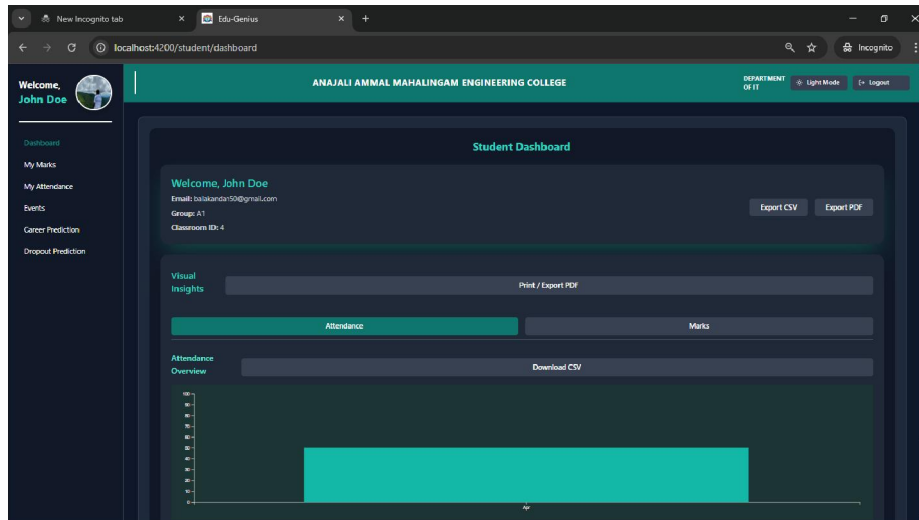

Module 4: Authentication Module

The certification module ensures safe and modern access controls through an OTP-based login and registration system. Users verify their identity using a one-time password, increasing security on traditional password methods. During registration, the profile photo upload is handled through multipart file support in the backend, images are safely stored as byte arrays. On successful login, angular route guards and local storage tokens guide users for their respective dashboard (administrator, teacher, or student), ensuring a spontaneous and role-specific user experience. JWT tokens are used to manage sessions security and API authority throughout the system.
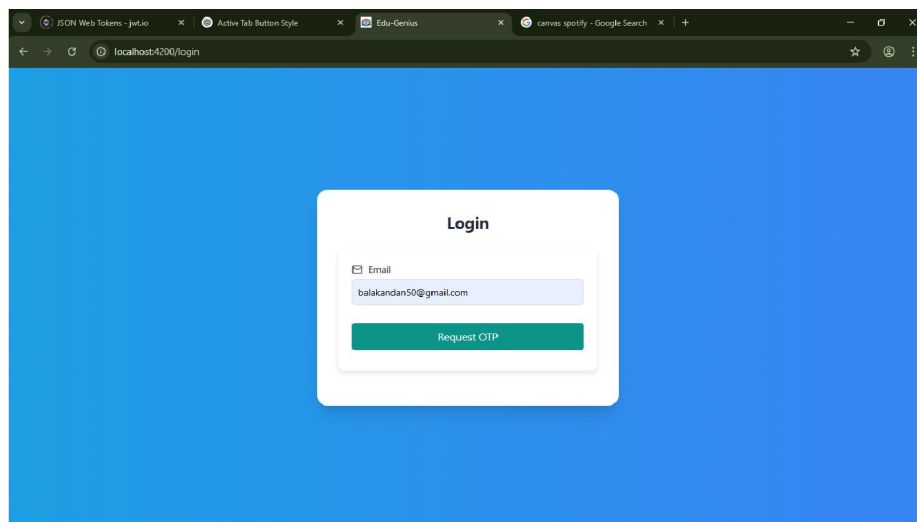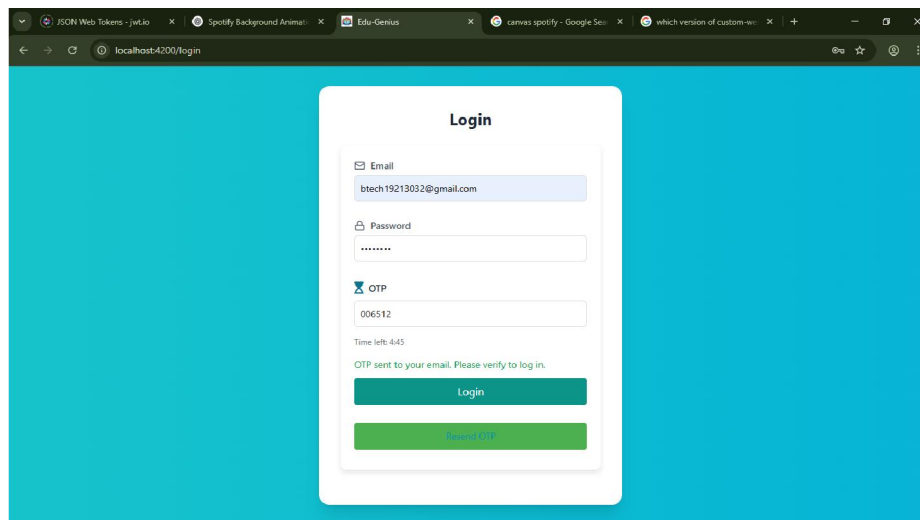
Module 5: AI Integration

AI integration modules introduce intelligent abilities in LMS. For career guidance, it connects to an external AI model, feeding the student's educational data and returns individual courses and job tips. For predicting dropout risk, it analyzes historical appearance and marks students who may be at risk of academic disintegration or failure. For future attendance prediction, it analyzes the historical attendance data and forecasts the future attendance. These insights are processed by spring AI services and displayed through angular components in the student and administrator dashboard. This active intelligence equips users with data-operated guidance and initial warnings systems
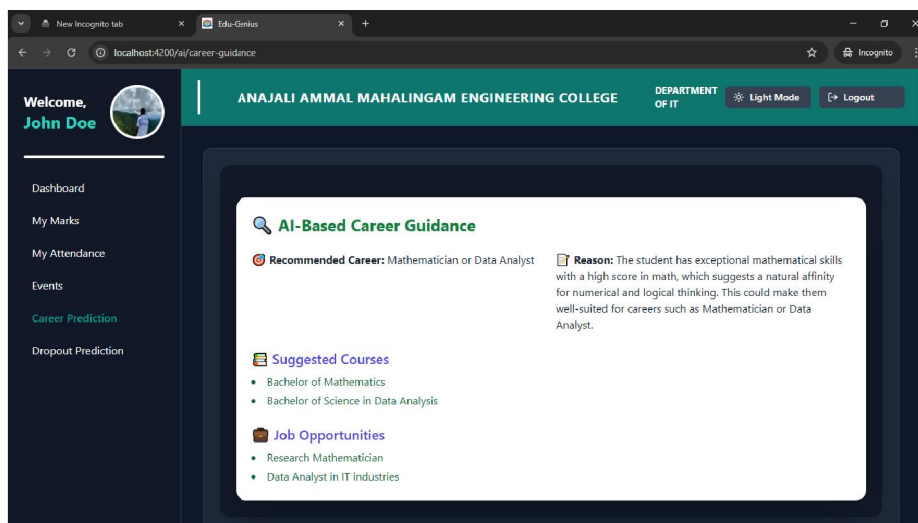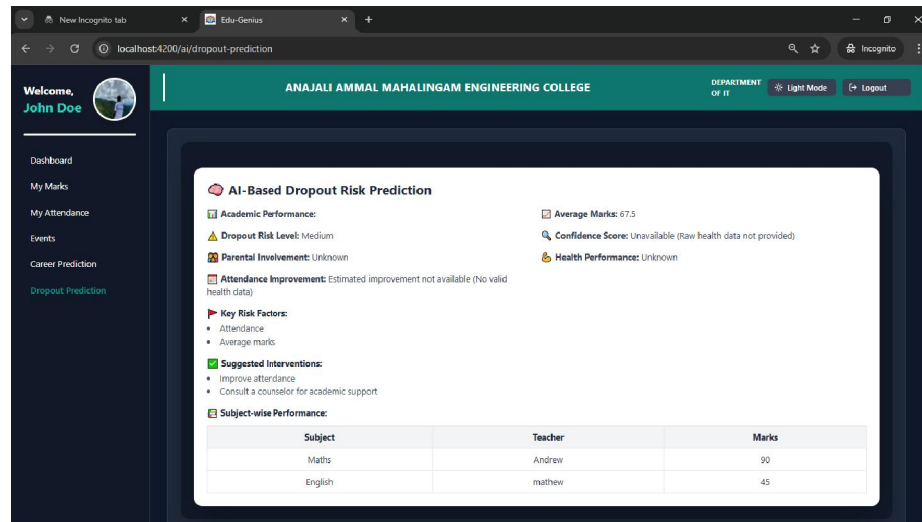
VII. CONCLUSION

The role developed using angular and spring boots provides a safe and user-specific educational management experience for students, teachers, and administrators. With integrated AI features such as dropout prediction, future attendance prediction and career guidance, the system goes beyond basic LMS functions to provide intelligent educational assistance. It automatically makes appearance and entry into signs, reduces manual workload, and reduces errors. AI analytics helps teachers identify struggling students and suggest improvement strategies. Roll-based dashboards ensure that each user accelerates relevant data efficiently. Overall, it increases LMS learning, supports informed decision making, and brings modern technology to education management

VIII. FUTURE WORK

In the future, Our LMS can be enhanced with Personalized Learning Recommendations to guide students with tailored resources based on their academic performance, login page includes an option to log in via Fingerprint, in addition to the traditional login method, Dynamic Timetable is generated based on teacher availability and various scheduling conditions, Parent & Teacher Communication Portals to streamline collaboration and updates, and Gamification with Leaderboards to motivate students through rewards, badges, and healthy competition.

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