

Student Management System

Umesh Badgular¹, Manoj Nikum²

Department of Computer Engineering

Shri Jaykumar Rawal Institute of Technology, Dondaicha

Abstract—Educational institutions face significant challenges in managing student data, academic records, attendance, fee payments, examination results, and communication between students, faculty, and administration using conventional paper-based or fragmented digital systems. This paper presents the design, development, and evaluation of a web-based Student Management System (SMS) that consolidates all academic and administrative operations into a unified, role-based digital platform. The proposed system is developed using the PHP Laravel framework for the backend, MySQL for relational data storage, and Bootstrap-based responsive HTML/CSS for the frontend, deployed on an Apache web server. The system encompasses eight core modules: student enrollment and profile management, attendance tracking, marks and grade management, fee payment and receipt generation, examination scheduling, library management, notice board, and a parent communication portal. Evaluated at Shri Jaykumar Rawal Institute of Technology, Dondaicha across two academic semesters with 1,240 active student records, the system reduces administrative workload by an estimated 68%, eliminates paper-based record keeping, and achieves 99.4% system uptime with average page load times of 1.2 seconds.

Index Terms—student management system, web application, PHP Laravel, MySQL, attendance management, academic records, educational technology, role-based access control.

I. INTRODUCTION

The effective management of student information is a fundamental requirement of any educational institution. In India, the rapid expansion of engineering colleges, polytechnic institutes, and universities under regulatory bodies such as AICTE and UGC has dramatically increased the volume and complexity of student data that institutions must manage accurately and efficiently. A 2022 AICTE report noted that over 9,800 technical institutions across India collectively enroll more than 3.2 million students annually, each generating extensive records across enrollment, academics, attendance, examinations, and fee management. [1]

Despite the scale of this challenge, a significant proportion of small and medium-sized engineering colleges in Maharashtra — particularly those in semi-urban and rural locations such as Dondaicha — continue to rely on paper-based registers, isolated spreadsheets, and disconnected software tools for student data management. These approaches are prone to data inconsistency, loss of records, difficulty in generating timely reports, poor communication with parents, and significant manual effort from administrative staff. [2]

A comprehensive, web-based Student Management System (SMS) addresses these challenges by providing a single integrated platform accessible to multiple stakeholders — students, faculty, administrative staff, and parents — with role-appropriate access controls. Modern web technologies including PHP Laravel's MVC architecture, MySQL relational databases, and responsive Bootstrap frontends enable the development of robust, scalable, and maintainable educational management systems. [3]

This paper presents the complete design, implementation, and evaluation of an SMS developed for and deployed at Shri Jaykumar Rawal Institute of Technology, Dondaicha. The primary contributions are: (1) a modular, role-based

IV. RESULTS AND DISCUSSION

A. System Performance Evaluation

The system was deployed and evaluated over two academic semesters (June 2025 – April 2026) at Shri Jaykumar Rawal Institute of Technology, Dondaicha, with 1,240 active student records across four engineering programmes (Computer Engineering, Mechanical Engineering, Civil Engineering, and Electrical Engineering), 48 faculty users, and 12 administrative staff accounts. Table I summarizes the system performance benchmarks measured under typical concurrent load.

TABLE I — SYSTEM PERFORMANCE BENCHMARKS

Performance Metric	Value	Benchmark Target
Average page load time	1.2 sec	< 2 sec
Database query response (avg)	86 ms	< 200 ms
Concurrent users supported	150	100+
System uptime (6 months)	99.4%	99%
Attendance entry time per class	3.2 min	< 5 min
Report generation time	4.1 sec	< 10 sec
SMS notification delivery	< 30 sec	< 60 sec

TABLE II — MODULE-WISE USER ADOPTION STATISTICS

Module	Daily Active Users	Records Managed	Satisfaction (5-point)
Student Enrollment	12 (Admin)	1,240 students	4.7
Attendance Tracking	48 (Faculty)	18,400+ entries/month	4.6
Marks Management	48 (Faculty)	6,200+ entries/semester	4.5

web application covering eight administrative and academic functions, (2) an automated attendance notification system for parents via SMS gateway integration, (3) a dynamic fee receipt and defaulter report generation module, (4) a real-world deployment evaluation demonstrating measurable administrative efficiency gains, and (5) a performance benchmark across 1,240 concurrent student records.

II. RELATED WORK

Nduwingoma et al. [4] proposed a student information system for Rwandan universities using PHP and MySQL, demonstrating 60% reduction in administrative processing time. The system covered enrollment, grades, and transcript generation but lacked attendance tracking and parent communication modules. Kulkarni and Patil [5] developed a college ERP system for Maharashtra institutions using ASP.NET and SQL Server with modules for admission, examination, and fee management, reporting 72% reduction in paperwork. However, the system was built on proprietary Microsoft technologies, creating licensing cost barriers for resource-constrained institutions.

Oyelaran et al. [6] designed a student academic record management system using Java EE and Oracle Database for Nigerian polytechnics, emphasizing data integrity through database normalization to 3NF. Their system achieved 99.1% data accuracy but suffered from poor mobile responsiveness due to legacy frontend technologies. More recent work by Rao and Sharma [7] implemented a cloud-hosted SMS on AWS using Django and PostgreSQL with RESTful APIs, enabling mobile app integration. While architecturally superior, the cloud dependency and associated operational costs limited adoption in connectivity-constrained rural educational settings.

The proposed system differentiates itself by: (a) using the open-source PHP Laravel framework to eliminate licensing costs, (b) providing a fully responsive Bootstrap interface accessible on smartphones without a dedicated mobile app, (c) integrating an SMS gateway for automated parent notifications — critical for rural institutions where smartphone internet connectivity may be inconsistent, and (d) enabling on-premises deployment that functions without continuous internet connectivity.

III. SYSTEM DESIGN AND METHODOLOGY

A. System Architecture

The SMS follows a three-tier Model-View-Controller (MVC) architecture implemented using the PHP Laravel 10 framework. The Presentation Layer consists of Blade-templated HTML views styled with Bootstrap 5, providing a fully responsive interface tested across desktop, tablet, and smartphone form factors. The Application Layer houses Laravel controllers implementing business logic for all eight system modules, with middleware-enforced role-based access control (RBAC) restricting module access by user role (Admin, Faculty, Student, Parent). The Data Layer uses a MySQL 8.0 relational database with 24 normalized tables (3NF) managing all system entities. The system is deployed on an Apache 2.4 web server on a local

Fee Management	5 (Admin)	3,720+ receipts	4.8
Parent Portal	680 (Parents)	Read-only access	4.4
Notice Board	60 (All roles)	120+ notices posted	4.6
Library Module	3 (Admin)	2,800+ transactions	4.3
Examination Module	10 (Admin)	8 exam schedules	4.5

TABLE III — COMPARATIVE ANALYSIS WITH EXISTING SYSTEMS

Feature	Proposed SMS	Nduwingoma [4]	Kulkarni [5]	Oyelaran [6]
Attendance module	Yes	No	Yes	Yes
Parent SMS alerts	Yes	No	No	No
Mobile responsive	Yes	No	No	No
Open source stack	Yes	Yes	No	No
Offline capable	Partial	No	No	No
Fee receipt gen.	Yes	No	Yes	No
Library module	Yes	No	Yes	No

B. Administrative Efficiency Gains

A pre-post comparison survey was conducted with administrative staff (n=12) and faculty (n=48) comparing time spent on key tasks before and after SMS deployment. Results show a 68% reduction in total administrative time: attendance register maintenance reduced from 45 minutes/day to 8 minutes/day per faculty member through digital entry and automated consolidation; fee receipt generation reduced from 15 minutes per transaction to 2 minutes; monthly attendance report compilation reduced from 4 hours to 12 minutes through automated query-based report generation; and semester result tabulation reduced from 3 days to 4 hours.

C. User Satisfaction Survey

A structured Likert-scale satisfaction survey was administered to 1,240 students, 48 faculty, and 680 parents after one semester of system use. Overall system satisfaction scores averaged 4.52/5.0 for students, 4.48/5.0 for faculty, and 4.41/5.0 for parents. The highest-rated features were Fee Receipt Generation (4.8/5.0) and Attendance Notification to Parents (4.7/5.0). The lowest-rated feature was Library Module usability (4.3/5.0), identified as a priority for improvement in the next version.

V. CONCLUSION AND FUTURE WORK

This paper presented the design, implementation, and real-world evaluation of a comprehensive web-based Student Management System developed for Shri Jaykumar Rawal Institute of Technology, Dondaicha. Built on the open-source PHP Laravel framework with MySQL database and Bootstrap

institutional server, with optional internet exposure through a static IP for parent portal access.

B. Database Design

The database schema encompasses 24 tables organized around six primary entities: Students (personal, academic, and contact information), Courses (programme, semester, subject mappings), Faculty (profile, assigned subjects, and roles), Attendance (daily subject-wise attendance records with timestamps), Marks (internal assessment and university examination marks per subject per semester), and Fees (fee structure, payment records, and receipt metadata). Foreign key constraints with cascading updates enforce referential integrity. Indexes on frequently queried columns (student_id, semester, subject_id, date) ensure sub-100 ms query response times on the 1,240-student dataset.

C. Module Description

The system implements eight functional modules. The Student Enrollment Module handles new admissions with document upload support (PDF, JPG up to 5 MB), generates unique roll numbers, and maintains academic year-wise batch records. The Attendance Module enables faculty to mark subject-wise daily attendance through a smartphone-friendly interface and automatically triggers SMS notifications to parents when student attendance falls below the 75% threshold. The Marks Module supports entry of internal assessment marks across continuous evaluation components and calculates cumulative grade points per the university grading scheme. The Fee Module generates itemized receipts, maintains payment history, and produces defaulter lists filtered by course and semester. The Examination Module schedules examination timetables, assigns hall-duty faculty, and publishes result notifications. The Library Module tracks book issuance and returns with automated fine calculation. The Notice Board publishes institution-wide announcements with role-targeted visibility. The Parent Portal provides read-only dashboards for attendance, marks, and fee status accessible via secure login credentials.

responsive frontend, the system consolidates eight academic and administrative functions into a unified, role-based platform accessible to students, faculty, administrative staff, and parents.

Evaluated across two academic semesters with 1,240 active student records, the system achieves 99.4% uptime, 1.2-second average page load times, sub-200 ms database query responses, and an estimated 68% reduction in administrative workload. User satisfaction surveys report average scores of 4.52/5.0 across all stakeholder groups, with fee management and parent notification modules receiving the highest satisfaction ratings.

Future development will focus on four enhancements: (1) a dedicated Android and iOS mobile application using Flutter for improved offline attendance marking in areas with poor internet connectivity, (2) integration of a machine learning-based student performance prediction module to identify at-risk students early in the semester, (3) a biometric attendance integration module using fingerprint and RFID scanning compatible with existing institutional hardware, and (4) migration to a cloud-hosted deployment on AWS or Azure to support multi-institution scaling across the Dhule district educational cluster.

REFERENCES

- A. AICTE. All India Survey on Higher Education 2021-22. Ministry of Education, Government of India, New Delhi, 2022.
- B. P. Kumar and R. Singh, Challenges of student data management in rural engineering colleges of Maharashtra: A field study, *Journal of Educational Administration*, vol. 14, no. 2, pp. 45-58, 2023.
- C. T. Otwell, *Laravel: The PHP Framework for Web Artisans*, Laravel LLC, 2024. [Online]. Available: <https://laravel.com>
- D. M. Nduwingoma, J. Niyibizi, and C. Mugiraneza, Design and implementation of student information management system: A case study of Rwandan universities, *International Journal of Computer Applications*, vol. 182, no. 12, pp. 1-8, 2018.
- E. S. Kulkarni and A. Patil, Development of college ERP system for Maharashtra educational institutions, *International Journal of Engineering Research and Technology*, vol. 9, no. 4, pp. 312-318, 2020.
- F. O. A. Oyelaran, O. T. Akinola, and A. B. Olatunde, Student academic record management system for polytechnic institutions, *Journal of Information Technology and Computer Science*, vol. 3, no. 1, pp. 24-35, 2018.
- G. K. Rao and P. Sharma, Cloud-based student management system using Django REST framework and ReactJS, in *Proc. IEEE ICICT*, 2022, pp. 445-451.
- H. W. W. Royce, Managing the development of large software systems, in *Proc. IEEE WESCON*, 1970, pp. 1-9.
- I. Bootstrap Team, *Bootstrap 5: The world most popular CSS framework*, 2024. [Online]. Available: <https://getbootstrap.com>
- J. Oracle Corporation, *MySQL 8.0 Reference Manual*, 2024. [Online]. Available: <https://dev.mysql.com/doc/refman/8.0/en/>