

Student Attendance Management System Using Face Recognition Using Deep Learning

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Abstract: Traditional classroom attendance systems are often time-consuming, prone to proxy attendance, and difficult to maintain manually. With advancements in computer vision and artificial intelligence, automated solutions offer efficient alternatives for academic institutions.

This research presents RollVision, a comprehensive web-based and vision-integrated platform designed to automate student attendance tracking using face recognition technology. The system integrates Django framework for robust backend management, database organization, and role-based access control for administrators, HODs, faculty, and students. Data collection involves systematic student enrollment, image capture, and deep learning-based face encoding storage.

The system architecture seamlessly handles camera feeds from multiple sources (webcam, IP streams, and CCTV) to recognize students in real-time, compute lecture-wise attendance statistics, and manage academic workflows such as assignments and announcements.

The findings indicate that automating attendance through computer vision significantly reduces administrative overhead, eliminates proxy attendance, and streamlines modern classroom management.

Keywords: Face Recognition, Smart Attendance, Django, Computer Vision, Student Management, Automation

I. INTRODUCTION

Managing student attendance is a daily critical task in educational institutions. Traditional methods involve manual roll calls or paper-based registers, which consume valuable lecture time and are vulnerable to human error and proxy attendance.

Modern educational environments require digital transformation. Integrating computer vision with web technologies allows institutions to monitor student presence accurately and instantaneously. RollVision is developed to address these exact challenges by combining an intuitive web dashboard with automated face recognition capabilities.

The primary aim of this research is to design, develop, and implement an integrated system that automates attendance tracking, manages academic schedules, and provides role-based access to faculty members and students.

II. PROBLEM STATEMENT

Manual attendance systems present several bottlenecks in colleges and universities:

- Considerable time is lost during roll calls in large classrooms.
- Manual records lack real-time verification, leading to proxy attendance issues.
- Compiling monthly or semester-wise attendance percentages manually is tedious for faculty.
- Lack of an integrated platform connecting attendance data directly with academic tasks like assignments and leave applications.



Therefore, this research implements RollVision to establish a secure, fast, and automated framework for accurate student tracking and academic administration.

III. OBJECTIVES

The main objectives of this research are:

1. To design a centralized database architecture using Django ORM for comprehensive student and lecture management.
2. To implement a flexible camera integration module supporting webcams, USB devices, mobile feeds, and RTSP/CCTV streams.
3. To build a secure face recognition pipeline for automated attendance marking and confidence scoring.
4. To establish a role-based access control (RBAC) system for Admins, HODs, Faculty, and Students.
5. To streamline academic workflows including timetable scheduling, class-teacher assignments, announcements, and leave applications.
6. To evaluate the system's performance in terms of speed, processing efficiency, and operational accuracy.

IV. LITERATURE REVIEW

Sr. No.	Author & Year	Research Topic	Main Finding
1	Moolchandani et al. (2020)	Automated Attendance System using Face Recognition	Highlighted that biometric and facial recognition methods reduce proxy attendance and save instructional time.
2	Zhang et al. (2021)	Real-time Classroom via Monitoring Deep Learning	Demonstrated high accuracy in detecting multiple faces simultaneously in dynamic classroom settings.
3	Kumar et al. (2022)	Django-based Academic Management Portals	Emphasized the security and scalability of Django ORM for handling relational academic datasets.

V. RESEARCH GAP

While many existing studies focus purely on standalone face recognition scripts or basic desktop applications, they often lack a complete administrative ecosystem.

RollVision bridges this gap by combining real-time computer vision streams with a full-stack Django web application. It not only captures attendance via facial encodings but also handles lecture timetables, session tracking, automated absent calculations, student leave workflows, and multi-tier user roles within a single unified platform.

VI. METHODOLOGY

The development of RollVision followed a structured software engineering and quantitative evaluation methodology:

- **System Design:** Defined relational database models using Django, structuring entities for Students, Faculty, Subjects, Divisions, Lecture Periods, and Attendance Records.
- **Data Capture & Encoding:** Student photos and unique student identifiers were captured to generate face encodings securely stored in JSON format via the FaceEncoding model.
- **Stream Processing:** Configured flexible inputs (SystemSettings) allowing OpenCV to interface with default webcams, external USB setups, mobile cameras, or CCTV RTSP feeds.
- **Attendance Session Logic:** Automated workflows where a faculty member initiates an active session for a specific lecture period, letting the vision module evaluate and log present students while calculating absent counts automatically.



VII. DATA COLLECTION

- Primary Data: Collected through system registrations, student profile inputs, administrative configurations, and real-time camera inference logs within the application framework.
- Secondary Data: Gathered via technical documentation, computer vision research papers, OpenCV guidelines, and Django framework architecture standards.

VIII. SYSTEM ARCHITECTURE & DATA ANALYSIS

The system architecture is structured around Model-View-Template (MVT) design patterns provided by Django:

- Models Layer: Manages database tables (Student, AttendanceRecord, LectureSchedule, UserProfile).
- Processing Layer: Handles camera source resolution and face matching algorithms.
- Dashboard & Reporting: Provides real-time visibility into lecture percentages, session statuses, and administrative controls.

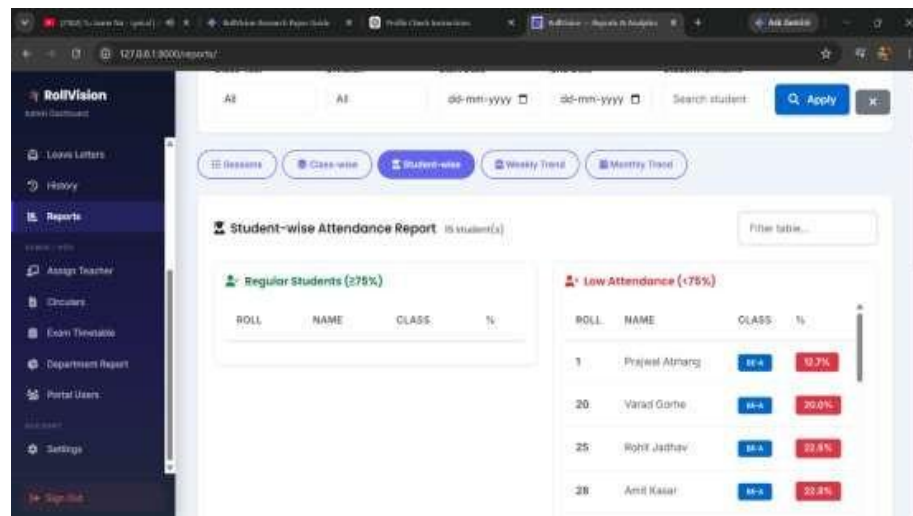
IX. IMPLEMENTATION DETAILS

The implementation utilizes robust technologies:

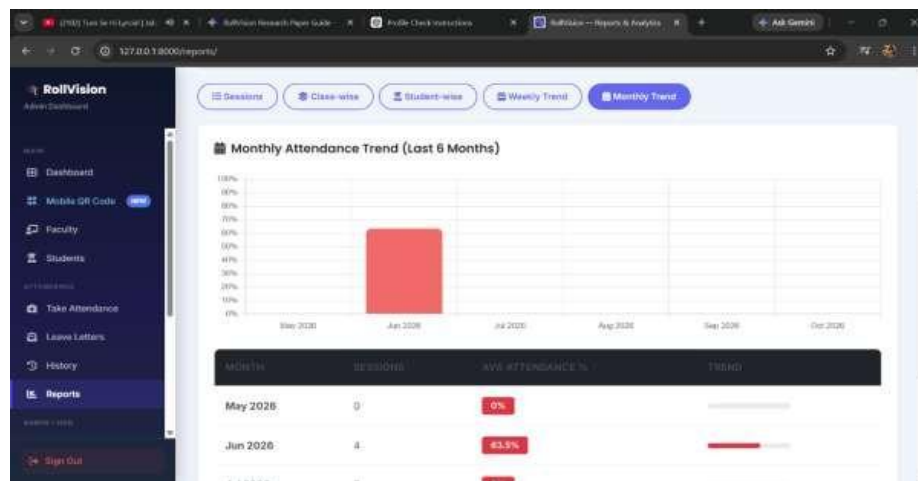
- Backend Framework: Python & Django (leveraging Django ORM for secure database operations).
- Computer Vision & Image Processing: OpenCV and face recognition libraries for stream capture and vector matching.
- Database: SQLite / PostgreSQL for reliable relational data storage.
- Frontend: HTML5, CSS3, and JavaScript templates integrated with Django templates for responsive user interfaces.

X. RESULT AND DISCUSSION

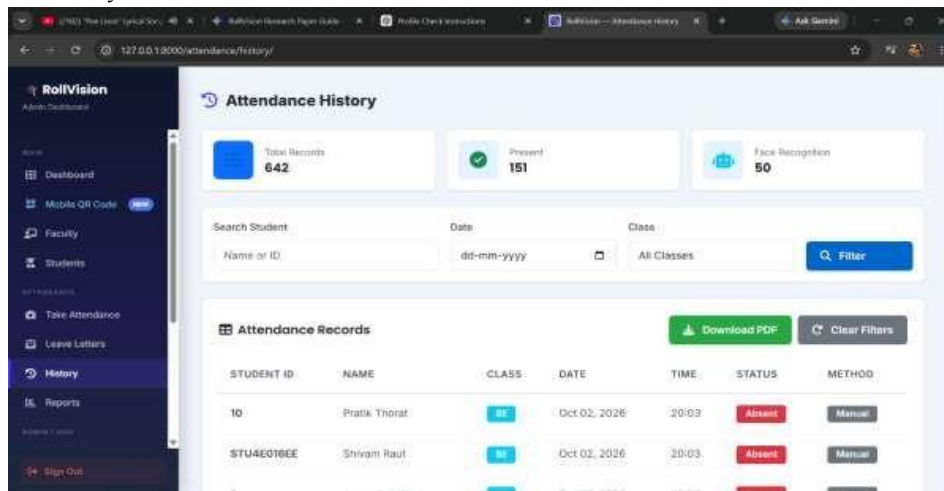
- Student-wise attendance report



- Monthly attendance trend.



- Attendance History.



Attendance History

Total Records: 642 | Present: 151 | Face Recognition: 50

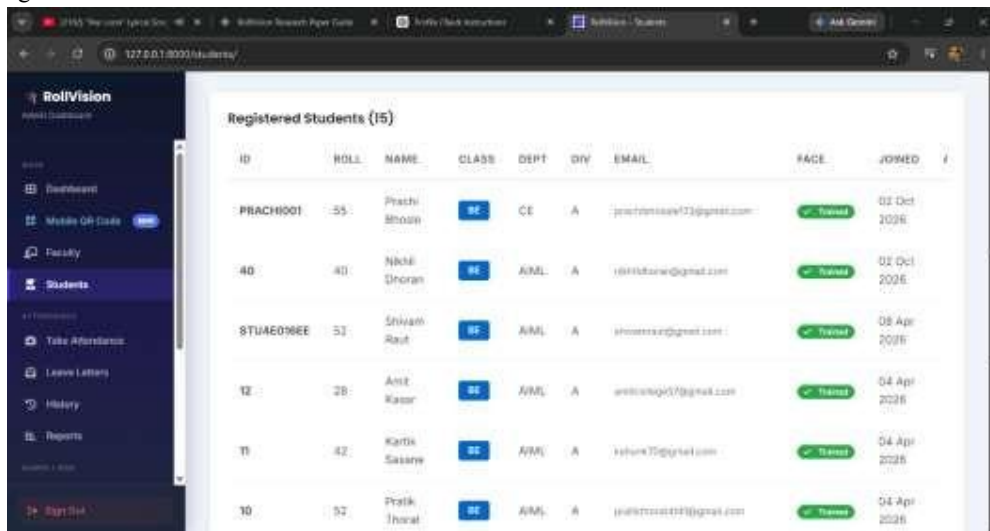
Search Student: Date: Class:

Attendance Records

STUDENT ID	NAME	CLASS	DATE	TIME	STATUS	METHOD
10	Pratik Thorat	BT	Oct 02, 2026	20:03	Absent	Manual
STUAE016EE	Shivam Raut	BT	Oct 02, 2026	20:03	Absent	Manual



- Registered Students



The screenshot shows a web application interface for 'RollVision'. On the left is a dark sidebar with navigation options: Dashboard, Mobile QR Code, Faculty, Students (selected), Take Attendance, Leave Letters, History, and Reports. The main content area is titled 'Registered Students (15)' and displays a table with the following columns: ID, ROLL, NAME, CLASS, DEPT, DIV, EMAIL, FACE, and JOINED. The table lists six students with their respective details.

ID	ROLL	NAME	CLASS	DEPT	DIV	EMAIL	FACE	JOINED
PRACH001	55	Prachi Shrivastava	BC	CE	A	prachinshwari73@gmail.com		02 Oct 2026
40	40	Nikhil Shrivastava	BC	AMEL	A	nikhilshwari@gmail.com		02 Oct 2026
STUAE016EE	53	Shivam Raut	BC	AMEL	A	shivamr@gmail.com		08 Apr 2026
12	28	Anil Katar	BC	AMEL	A	anilkatar57@gmail.com		04 Apr 2026
15	42	Kartik Sasane	BC	AMEL	A	kartik70@gmail.com		04 Apr 2026
10	57	Pratik Shrivastava	BC	AMEL	A	pratikshwari73@gmail.com		04 Apr 2026

XI. CONCLUSION

RollVision successfully demonstrates how computer vision can be integrated into modern educational workflows. By automating face recognition-based attendance and combining it with complete student management features (such as timetable scheduling, leave applications, and announcements), the system eliminates manual bottlenecks and proxy attendance. The platform provides a scalable, secure, and user-friendly solution for modern academic institutions.

XII. LIMITATIONS AND FUTURE SCOPE

Limitations:

- Recognition accuracy can be affected by poor ambient classroom lighting or low-resolution camera angles.
- Processing heavy multi-stream CCTV feeds simultaneously requires adequate hardware resources (GPU acceleration).

Future Scope:

- Integration of advanced deep learning models (such as YOLO-based face detection) to handle dense crowds in large lecture halls more efficiently.
- Addition of automated SMS/WhatsApp parent alert notifications when a student is marked absent.

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