

Attenzy

Smart Proxy-Proof Attendance System

1. Introduction

Attendance in colleges has always been a challenge—manual roll calls waste valuable class time, proxies dilute discipline, and biometric/RFID systems require expensive hardware.

Attenzy solves this by providing a **secure, hardware-free, proxy-proof attendance management system**. It works through **dynamic expiring codes, geofencing, real-time dashboards, and deep analytics**, making attendance transparent, efficient, and reliable.

2. Stakeholders

1. **Students** – Mark attendance securely, view progress, get forecasts.
2. **Faculties** – Manage classes, generate attendance, and analyze data.
3. **College Admins** – Manage students/faculty, monitor compliance, and view insights.

3. System Features

3.1 Student Mobile App Features

Core Attendance Features

- Join a scheduled class using Class **ID**.
- Enter the **expiring dynamic code** shown by faculty (resets every 45s).
- **Geolocation validation** ensures the student is within a 10m radius of the faculty's device.
- Receive confirmation of successful attendance marking.

Dashboard & Analytics

- Personal attendance percentage per subject & overall.
- Defaulter status highlight (red/yellow/green indicators).
- Insights: *"You need to attend 6 more lectures to reach 75% in Digital Electronics."*
- Visual graphs: line chart of attendance trend, pie chart of subject-wise percentages.

Notifications & Alerts

- Low attendance alerts (below 75% or institution threshold).
- Class reminders & push notifications when faculty schedules a session.
- Auto-reminder before class: “Your attendance in Physics is 72%, don’t miss today’s class.”

Profile & Authentication

- Secure login (SSO/OAuth or College credentials).
- Profile with student details: Name, Roll No., Department, Batch, Subjects.

Advanced (Future Scope)

- Gamification: badges for 100% attendance streaks.
- Peer comparison (anonymous percentile ranking).

3.2 Faculty Mobile App Features

Class Scheduling

- Create and schedule a class with subject, date, time, and duration.
- Auto-generate **Class ID** and **Expiring Code (45s refresh cycle)**.
- For offline classes, faculty can dictate the code orally and then students can type it out in their apps.
- In case of online classes, faculty can share the screen with QR code, which can be scanned by students attending the meeting.

Attendance Monitoring

- Real-time view of students marking attendance.
- Ability to close attendance marking after X minutes.
- Manual override: faculty can mark a student present/absent in special cases.

Advanced Feature

- In case there are countable students in the class, the faculty can type the manual student count in the class. In case there are extra attendances marked using proxies, then random

extra attendances will be cancelled from the overall class, with the final count equal to the number entered by the faculty.

Reports & Analytics

- Class-wise attendance record (daily, weekly, monthly, semester).
- Student-wise reports: individual attendance trends, defaulter list.
- Export reports in **PDF/Excel**.
- Subject performance analysis:
 - Avg. attendance %
 - Most punctual students
 - Most irregular students

Notifications

- Alerts when students attempt attendance outside geofence.
- Notification when class attendance falls below a threshold (e.g., <50% turnout).

Profile & Authentication

- Faculty profile with name, department, and subjects handled.
- Secure login with 2FA.

3.3 Admin Web Portal Features

User Management

- Add, authenticate, and manage student and faculty accounts.
- Bulk upload of student/faculty data via CSV/Excel.
- Assign students to courses, faculties to subjects.
- Role-based access control (Admin, Super Admin, Auditor).

Schedule Management

- Upload master timetable/schedule for all departments.
- Link faculties and students to their respective classes.

Attendance Monitoring & Insights

- Institution-wide attendance dashboards:
 - Department-wise, year-wise, faculty-wise summaries.
 - Subject-wise averages.
 - Defaulter list (college-wide).
- Compare faculty efficiency (attendance % trends in their classes).
- Predictive analytics:
 - Students at
 - risk of shortage.
 - Future attendance projections.

Reports & Exports

- Generate consolidated reports (daily, weekly, monthly, semester).
- Export in **Excel, PDF, CSV**.
- API support for integration with ERP/LMS systems.

Security & Audit

- View logs of all attendance entries.
- Detect anomalies: e.g., too many students using the same IP/device.
- Audit trails of faculty and admin actions.

Notifications

- Send global announcements (holidays, events, reminders).
- Push defaulter notifications to students/faculties.

Advanced (Future Scope)

- Cross-institution analytics (for multi-campus colleges).
- Integration with University portals for automatic compliance reporting.
- Blockchain-based immutable recordkeeping.

4. System Architecture

Flow:

1. Faculty schedules class → Class ID + Expiring Code generated.
2. Students present in geofence enter expiring code.
3. System validates → Marks attendance → Updates DB.
4. Dashboards update for student, faculty, and admin in real time.

High-Level Architecture Components:

- **Mobile Apps (React Native)** → Students & Faculties.
- **Web App (React.js)** → Admins.
- **Backend (Spring Boot)** → APIs, business logic.
- **Database (MongoDB)** → User, attendance, class, schedule records.
- **Geofencing (Google Maps API).**
- **Code Generation (TOTP Algorithm).**
- **Analytics (Chart.js / D3.js/ Python Libraries).**
- **Deployment (AWS/GCP).**

5. Security Features

- **Dynamic expiring codes** → 45s validity prevents proxy sharing.
- **Geolocation lock (10m radius)** → ensures student is present in class.
- **JWT-based authentication** → secure API calls.
- **Role-based access control** → different privileges for students, faculties, admins.
- **Data encryption** → attendance records stored securely.

6. Benefits

- Eliminates proxies.
- No extra hardware cost.
- Real-time dashboards for all stakeholders.

- Predictive insights to avoid defaulter situations.
- Scalable across institutions.