Attendify: QR-Based Attendance Management System

Project Report

Submitted by:

Sahil Raj (2401410004)

Nirmit Dudeja (2401410022)

Pallavi Baiju (2401410030)

Dhuruv (2401410032)

Under the supervision of:

Mr Vishwanil Suman

Department of Computer Science and Engineering

School of Engineering and Technology

K.R Mangalam University, Gurugram- 122001, India

INDEX

Acknowledgement

We would like to express our heartfelt gratitude to K.R. Mangalam University for providing us with the opportunity and platform to work on this project titled "Attendify: QR-Based Attendance Management System." This project has not only enhanced our technical skills but also enriched our understanding of real-world problem-solving through technology.

We are especially thankful to the School of Engineering and Technology (SOET) for its constant support, infrastructure, and motivation throughout the duration of the project. The academic environment and the encouragement we received from our department played a crucial role in helping us transform our idea into a functional system.

Our deepest thanks go to our respected faculty members and professors, whose guidance and feedback were instrumental at every phase of development. We would like to specifically acknowledge:

- Dr. Anshu, Mentor, for her leadership, encouragement, and consistent support throughout this academic journey.
- Mr. Vishwanil Suman, our project mentor, for providing us with insightful suggestions, technical direction, and constant motivation, which helped us stay focused and improve the system's quality.
- All teaching and non-teaching staff members who assisted us directly or indirectly during the completion of this project.

Finally, we extend our appreciation to our classmates and peers for their encouragement, feedback, and collaboration, which created a productive and engaging learning environment.

Without the combined efforts of everyone at K.R. Mangalam University, this project would not have been possible.

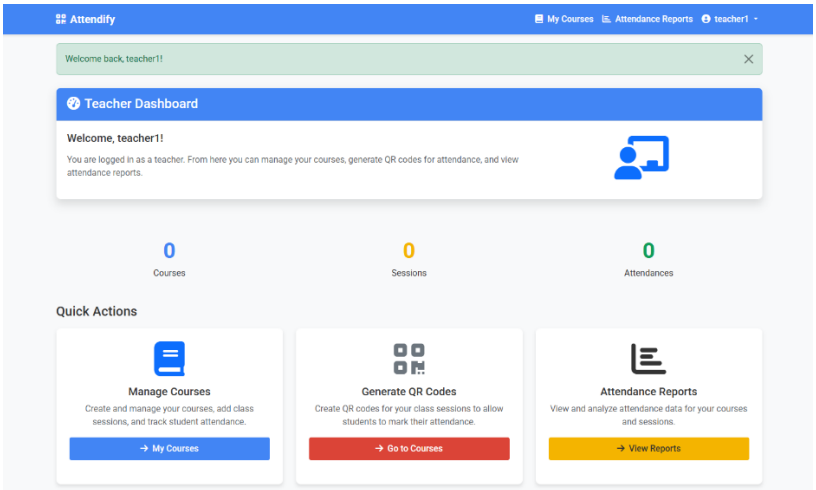
Project Overview

The **Attendify** system is an innovative web-based solution designed to streamline the attendance management process in educational institutions. It leverages QR codes to facilitate a quick and accurate way for students to mark their attendance. Teachers can generate unique, time-sensitive QR codes for each class session. These codes are displayed for students to scan with their mobile devices or webcams, ensuring a seamless attendance marking process.

The system operates in real-time, meaning attendance is recorded as soon as the student scans the QR code. This eliminates the delays and errors associated with manual attendance-taking methods. Administrators, teachers, and students all have tailored interfaces, providing each user with the tools and permissions necessary for their specific roles.

For teachers, the system offers an easy way to manage classes, generate QR codes, and track student participation. Administrators can monitor overall attendance statistics, generate reports, and oversee user access. Students benefit from the simplicity and convenience of scanning a QR code to register their attendance, making the process fast and hassle-free.

With a responsive design that works on both mobile and desktop devices, Attendify enhances the efficiency and accuracy of attendance tracking, ensuring a modern and reliable solution for educational institutions.



(Project Screenshot)

Objective

The primary objective of the **Attendify** project is to develop an efficient, automated attendance management system that significantly reduces the time and effort associated with traditional manual attendance recording. In educational institutions, taking attendance manually can be time-consuming, prone to errors, and disruptive to the learning environment. Attendify aims to address these issues by providing a streamlined, digital solution that simplifies the entire process.

By leveraging QR codes, the system ensures that attendance is recorded quickly, accurately, and securely. Each class session generates a unique, time-sensitive QR code, which teachers display for students to scan using their mobile devices or webcams. This eliminates the need for students to physically sign in or wait for the roll-call, making the process faster and more efficient.

Moreover, Attendify offers real-time attendance tracking, which ensures that data is recorded immediately when a student scans the QR code. This improves accuracy by eliminating any potential delays or errors in manual data entry. The system also provides administrators and teachers with the ability to track and manage attendance remotely, allowing them to generate detailed reports and analyze attendance trends over time.

In essence, the goal of this project is to create a reliable, secure, and user-friendly attendance management system that not only saves time but also enhances the overall efficiency and accuracy of attendance processes in educational institutions.

Target Audience

- **Educational Institutions**: Schools, Colleges, and Universities
- **Teachers**: For creating and managing attendance
- **Students**: For marking their attendance via QR codes
- **Administrators**: For overseeing the entire system and generating reports

Technologies Used

- **Backend**:
  - Python (Django 5.1.7)
- **Frontend**:
  - HTML, CSS, JavaScript, Bootstrap 5, crispy-bootstrap5
- **Database**:
  - MySQL (via mysqlclient)
- **QR Generation**:
  - qrcode Python package
- **QR Scanning**:
  - Instascan.js
- **Image Handling**:
  - Pillow
- **Forms**:
  - django-crispy-forms
- **Tables**:
  - DataTables for enhancing table functionality

Features

1. User Authentication

- Secure login for administrators, teachers, and students.

2. Role-Based Access Control

- Different user types (admin, teacher, student) with specific interfaces and permissions.

3. QR Code Generation

- Teachers can generate unique, time-limited QR codes for attendance. These codes are only valid for the duration of the class.

4. QR Code Scanning

- Students can scan the QR code displayed by their teachers via their mobile or desktop device to mark attendance.

5. Class Management

- Administrators and teachers can create, edit, and archive classes within the system.

6. Student Enrollment

- Teachers and administrators can manage student enrollments for each class.

7. Attendance Reports

- Real-time reporting of attendance. Administrators can view detailed statistics and generate reports for specific time periods.

8. Responsive Design

- The application is fully responsive and works well on both mobile and desktop devices.

Installation & Setup

System Requirements

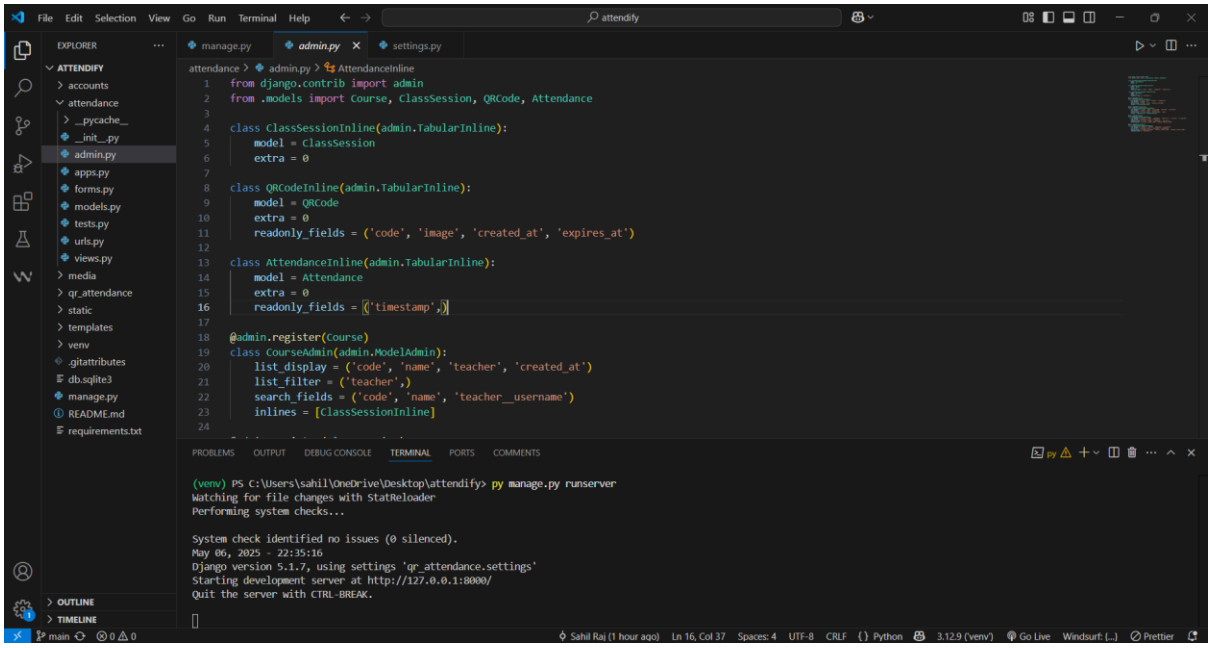
- **Python** 3.10 or higher
- **Django** 5.1.7
- **MySQL** 5.7 or higher
- **Virtual environment tool** (optional but recommended)

Installation Steps

1. **Clone the repository:**
2. git clone https://github.com/thesahilraj/attendify.git
3. cd attendify
4. **Create a virtual environment (optional but recommended):**
5. python3 -m venv venv
6. source venv/bin/activate # On Windows use: venv\Scripts\activate
7. **Install dependencies:**
8. pip install -r requirements.txt
9. **Configure the database:**
    - Open settings.py and update the database credentials in the DATABASES section.
10. **Apply database migrations:**
11. python manage.py migrate
12. **Create a superuser (admin):**
13. python manage.py createsuperuser
14. **Run the development server:**
15. python manage.py runserver

Default Login Credentials

- **Administrator**:
    - Username: admin
    - Password: admin123
- **Teacher**:
    - Username: teacher
    - Password: teacher123
- **Student**:
    - Username: student
    - Password: student123



(Demo of Installation & Setup)

Usage Instructions

For Teachers:

1. Log in with teacher credentials.
2. Create a new class or select an existing one.
3. Add students to the class or manage existing student enrollments.
4. Generate a unique, time-limited QR code for each class session.
5. Display the generated QR code for students to scan.
6. Monitor real-time attendance as students scan the QR code.
7. View attendance data for each class, including a list of students who have scanned the QR code.

For Students:

1. Log in with student credentials.
2. Navigate to the "Scan QR Code" page on the system.
3. Scan the QR code displayed by the teacher using their device's camera.
4. Verify that your attendance has been successfully marked.
5. View the list of classes attended and their attendance status.
6. Request attendance corrections (if there are issues) through a simple form or support option.

For Administrators:

1. Log in with administrator credentials.
2. Manage users, including adding or removing teachers and students.
3. Create, edit, or archive classes and courses.
4. View detailed attendance reports and statistics for all classes and users.
5. Download attendance reports in CSV format for offline analysis.

Security Features

1. **Password Hashing:** All passwords are hashed using the bcrypt algorithm, which enhances security by ensuring that passwords are never stored in plaintext. bcrypt is a strong cryptographic hashing function, making it more resistant to brute-force and rainbow table attacks.
2. **CSRF Protection:** Cross-Site Request Forgery (CSRF) protection is enabled for all forms within the application. This ensures that unauthorized commands are not executed on behalf of an authenticated user. By using CSRF tokens, the system prevents attackers from tricking users into performing unintended actions.
3. **Input Sanitization:** All user inputs, whether coming from forms, URLs, or other sources, are validated and sanitized to prevent SQL injection and other malicious inputs. This prevents attackers from injecting harmful SQL commands or executing scripts that could compromise the integrity and security of the database or application.
4. **Role-Based Access Control (RBAC):** The application implements Role-Based Access Control (RBAC), ensuring that each user type (Admin, Teacher, Student) can only access the data and functionality relevant to their role. For example, administrators can manage users and generate reports, while teachers can only access class data and attendance records. This minimizes the risk of unauthorized access and ensures that users only interact with the appropriate parts of the system.
5. **Session Security:** Several measures are in place to ensure that user sessions are secure. These include the use of secure cookies, session timeouts, and token-based authentication. By limiting the duration of sessions and using encrypted cookies, the system ensures that unauthorized users cannot hijack an active session, protecting sensitive information from being exposed.

These security measures, when combined, help to protect user data, prevent attacks, and maintain the integrity and privacy of the system.

Challenges Faced

QR Code Expiry:

- **Challenge:** Ensuring QR codes expire after a specified time window to prevent misuse, while balancing usability and security.
- **Solution:** To address this challenge, the system generates time-limited QR codes that are valid only for the duration of the class session. Once the QR code expires, it becomes invalid for scanning, ensuring that students cannot mark attendance after the class has ended. The expiry time can be adjusted by the teacher when creating the QR code to fit the length of the class. This prevents unauthorized access and enhances security without compromising the user experience.

Cross-browser Compatibility:

- **Challenge:** Ensuring that QR scanning functionality works seamlessly across different browsers (e.g., Chrome, Firefox, Safari) and devices (mobile, tablet, desktop).
- **Solution:** To achieve cross-browser compatibility, the QR scanning feature uses Instascan.js, a JavaScript library known for its reliability and support across multiple platforms. The system performs rigorous testing to ensure that QR code scanning works consistently across all major browsers and devices. Additionally, a fallback mechanism is implemented to handle cases where certain features may not work optimally on older browsers, ensuring the user experience remains uninterrupted.

Real-time Attendance Updates:

- **Challenge:** Implementing a seamless real-time attendance system that efficiently updates attendance for multiple users at once without causing delays or system crashes.
- **Solution:** The system uses AJAX (Asynchronous JavaScript and XML) for updating attendance data in real-time, ensuring that the information is automatically reflected in the teacher's and student's dashboards as soon as a QR code is scanned. This eliminates the need for page refreshes and ensures that attendance data is updated

without delay. Additionally, the system is designed to handle concurrent requests efficiently, ensuring that multiple students can scan the QR code simultaneously without any performance degradation.

Conclusion

The **Attendify QR-Based Attendance Management System** offers a highly efficient, easy-to-use, and secure solution for managing attendance in educational institutions. By automating the attendance process through QR codes, Attendify eliminates the inefficiencies and potential errors associated with traditional manual attendance methods. The system's design ensures that teachers can generate unique, time-limited QR codes for each session, allowing students to mark their attendance quickly and accurately by scanning the code with their mobile devices or webcams.

The **real-time attendance tracking** ensures that data is updated immediately, providing teachers and administrators with up-to-date information without delays. The system also offers comprehensive **attendance reports and analytics**, which can be accessed easily by administrators, making it a powerful tool for monitoring and improving student engagement.

With its **user-friendly interface** and seamless functionality across different devices and browsers, Attendify enhances the overall user experience for students, teachers, and administrators alike. Additionally, the **robust security features**, including password hashing, CSRF protection, and session security, ensure that user data remains safe and confidential.

In summary, Attendify simplifies the attendance management process, saving valuable time for both students and teachers while reducing errors and improving accuracy. Its secure, reliable, and intuitive system makes it a valuable tool for modern educational institutions.