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*Research Paper*

# FULL STACK ATTENDANCE SYSTEM WITH QR CODE

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**ABSTRACT**

*Full Stack Attendance System with QR Code is a modern web-based application designed to simplify and automate the process of managing student attendance. Traditional manual methods of recording attendance are time-consuming, error- prone, and vulnerable to proxy or manipulation. In this System, each student is assigned a unique QR code, which can be scanned by faculty through the web or mobile interface to mark attendance instantly. Authentication and role-based access controls are implemented to ensure that only authorized users (students, faculty, and administrators) can access specific functionalities. By eliminating manual record-keeping, reducing human errors, and providing tamper-proof attendance tracking.*

***KEY WORDS:*** *Attendance System, QR code Detection, MongoDB, MySQL, Smart Attendance, QR code Generation.*

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## I. INTRODUCTION

For compliance, assessment, and resource planning, accurate attendance tracking is crucial in both the workplace and in schools. Conventional approaches, such as spreadsheets, paper registers, or even simple RFID/biometrics, are time- consuming, prone to mistakes, and frequently unsuitable for remote or hybrid environments. They also cause issues with proxy attendance and make real-time reporting more difficult. This procedure is modernized by the Full Stack Attendance System with QR Code, which creates distinct, secure QR codes for every session (or user) and instantly verifies scans from employee or student devices. The system offers sophisticated analytics, fast attendance logging with fraud and duplicate avoidance, and role-based access (Admin, Faculty/Staff, Student/Employee). A cloud database safely stores data, allowing for remote access and centralized administration. While the backend implements business rules, authentication, and QR validation, a flexible web interface guarantees a seamless scanning, monitoring, and reporting experience. In summary for schools and organizations of any size, this solution offers streamlined reporting along with quick, accurate, and tamper-resistant attendance.

## II. LITERATURE SURVEY

Recently, several research papers related to Full Stack attendance system with QR code have been reviewed, revealing key limitations in traditional and existing solutions. Manual and biometric systems are often time-consuming, costly, and prone to proxy attendance. Cloud-based and QR- based models introduced in recent years improved automation but lacked real-time validation, data security, and scalability. To address these

issues, the proposed Full Stack Attendance System with QR Code integrates secure authentication, dynamic QR generation, and cloud storage to ensure accuracy, transparency, and efficiency in attendance tracking.

## III. RELATED WORK

The Full Stack Attendance System with QR Code utilizes modern web technologies to automate and secure attendance management. The backend is developed using Python Flask, which handles user authentication, QR validation, and database communication. For data storage, MongoDB Atlas is employed as a scalable and cloud-based database ensuring high availability and data integrity. The frontend is designed using HTML, CSS, and JavaScript, providing an intuitive and responsive user interface accessible on both web and mobile devices. QR code libraries such as qrcode, pyzbar, and Pillow are integrated for generating and scanning unique codes assigned to each student. JWT authentication ensures secure login and role-based access control for students, faculty, and administrators. The entire system operates on a cloud-deployed architecture, enabling real-time attendance marking, data synchronization, and easy scalability. Together, these technologies make the system efficient, secure, and adaptable for modern educational environments.

## IV. EXISTING SYSTEM

In many educational institutions and organizations, attendance is still managed using traditional methods such as manual roll calls, paper registers, or physical sign- in sheets. These approaches are time-consuming, prone to human error, and often lead to data manipulation or loss. To overcome some of these issues, biometric systems such as fingerprint scanners and RFID cards have been introduced. While these systems provide partial automation, they require expensive hardware, regular maintenance, and stable infrastructure, which may not be feasible for all institutions. Moreover, biometric devices raise hygiene concerns and are unsuitable for large-scale or remote attendance tracking. Some institutions have also adopted spreadsheet-based digital recording, but manual data entry still limits efficiency. Overall, existing methods lack real-time monitoring, flexibility, and fraud prevention, creating a need for a cost- effective, contactless, and cloud-based attendance management system that ensures accuracy, scalability, and security.

## PROPOSED SYSTEM

The proposed system automates student attendance using QR code technology. Each class session generates a unique QR code that students scan through a web or mobile application to mark their attendance. The scanned code is verified by the backend to ensure authenticity and prevent proxy attendance. The system stores all attendance records securely in a centralized database. Teachers can view, edit, and export attendance reports easily through an admin dashboard. The system uses technologies like React for the frontend, Node.js for the backend, and PostgreSQL for the database. QR codes are time-limited and digitally signed for security. This solution saves time, reduces manual errors, and provides real-time attendance tracking.

## SYSTEM ARCHITECTURE

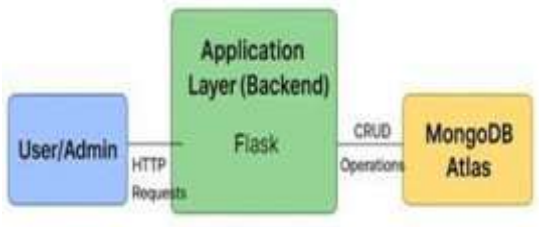



**Fig:1 Architecture of Full Stack Attendance System with QR Code**

## METHODOLOGY DESCRIPTION

The Full Stack Attendance System is designed to automate and secure attendance tracking using QR code technology. The system begins with user registration and

login, where authentication is handled via JSON Web Tokens (JWT) to ensure secure access. Once logged in, administrators can generate QR codes for specific sessions. These QR codes encode session details such as ID, timestamp, and expiration time, preventing reuse or manipulation. Users scan the QR code using their device camera, which sends the data to the backend for validation. The backend, built with Node.js and Express.js, checks the QR code's authenticity and logs attendance in a database like MongoDB or PostgreSQL. Each record includes the user ID, session ID, and timestamp. The frontend, developed using React.js, provides dashboards for both users and admins. Users can view their attendance history, while admins can monitor overall participation and download reports in PDF format. The system also supports additional features like email notifications, analytics dashboards, and optional geo-fencing for location-based verification. This methodology ensures a reliable, scalable, and user-friendly solution for modern attendance management.

## V. RESULTS AND DISCUSSION

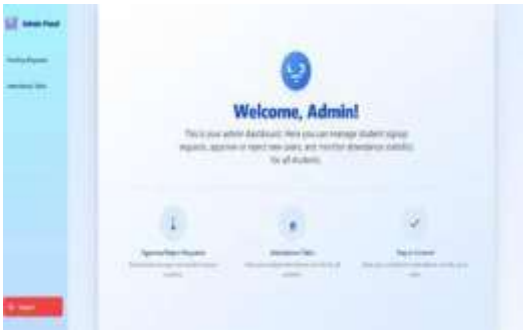



**Fig :2 Admin dashboard**

The Admin Panel dashboard provides a clean interface for managing student attendance and signup requests.



**Fig :3 User Profile**

The student dashboard offers a streamlined interface for managing personal attendance.



**Fig :4 Student QR Code**

The QR Code page in the student dashboard provides a secure and efficient way to mark attendance.

## VI. CONCLUSION

The Full Stack Attendance System with QR Code successfully automates and digitizes the traditional attendance process, making it more efficient, accurate, and user- friendly. By combining secure login, QR code verification, and real-time monitoring, the system minimizes manual intervention and ensures transparency for both students and administrators. The intuitive dashboards and role-based access enhance usability, while session-specific QR codes ensure data authenticity and prevent manipulation. Overall, the system provides a scalable and dependable solution for educational institutions seeking to modernize attendance management through technology.

## FUTURE SCOPE

In the future, the system can be enhanced with mobile application integration to allow students and faculty to mark and monitor attendance conveniently via smartphones. The implementation of geo-fencing can ensure that attendance is marked only within designated campus areas, improving authenticity. Additionally, biometric verification (such as fingerprint or facial recognition) can further strengthen security and prevent proxy attendance. Integration with cloud storage, AI-based analytics, and automated reporting tools will enhance scalability and insight generation. These advancements will make the system more adaptive, secure, and effective for large-scale institutional deployment.

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