QR Code Based Attendance System

Ms. Apurva S. Deshpande[1], Ms. Samrudhi S. Deshmukh[2], Ms. Shreya S. Gurav[3], Ms. Vedika B. Barule[4] ,Ms. Sailee S. Giri[5] and Lect. Chilme P. P.[6]

Student, Department of Computer Engineering[1,2,3,4,5]

Lecturer, Department of Computer Engineering[6]

Government Residential Women's Polytechnic, Latur, India

Abstract: *This project presents the development of a QR Code Based Attendance System using Java with JSP, HTML, CSS, and JavaScript for frontend development and MySQL for database management. The system facilitates efficient tracking of student attendance while ensuring authentication and preventing unauthorized access. The system comprises two main entities: Student and Staff. Students register by providing comprehensive details including Roll Number, Year, Department, Photo, Name, email id, phone number, address, and password. However, student login access is granted only after staff verification and approval, preventing anonymous access. Upon approval, students can log in to the system and download their ID Card containing a unique QR code. This QR code serves as a means for students to mark their attendance by presenting the ID card to a webcam. The system distinguishes between valid and invalid QR codes, ensuring accurate attendance recording. Additionally, a picture is captured each time attendance is marked, facilitating later verification if needed. Students have access to their attendance logs, allowing them to monitor their attendance record. Staff members can easily calculate student attendance by selecting the student and month, with the system providing the total number of days present. Moreover, staff can view attendance logs for all students, complete with attendance pictures, ensuring comprehensive monitoring and record-keeping. Overall, the QR Code Based Attendance System offers a convenient and secure method for managing student attendance, promoting accountability and efficiency in academic institutions*

Keywords: QR Code Attendance, Java JSP, Student Authentication, MySQL Database, Web-based System, Academic Monitoring, Image Capture, Secure Access

I. INTRODUCTION

In today's educational landscape, efficient and accurate attendance management is crucial for ensuring student engagement, academic performance, and institutional accountability. Traditional methods of recording attendance, often reliant on manual processes, are prone to errors, time-consuming, and lack real-time monitoring capabilities. These limitations underscore the need for a more robust and technologically advanced solution.

The QR Code Based Smart Online Student Attendance System addresses these challenges by leveraging modern technology to streamline and secure the attendance tracking process. Developed using Java with JSP, HTML, CSS, and JavaScript for the frontend and MySQL for the backend, this system integrates QR code technology to automate attendance marking, thereby enhancing accuracy and efficiency.

The system is designed to cater to two primary user entities: students and staff. Students register by providing essential personal details, which are then verified and approved by staff members to ensure authenticity and prevent unauthorized access. Upon approval, students receive an ID card with a unique QR code, which they use to mark their attendance by scanning it with a webcam. This process not only records attendance in real-time but also captures an image for verification purposes, ensuring the integrity of the attendance records.

Staff members benefit from a streamlined administrative process, with tools to approve registrations, monitor attendance logs, and generate comprehensive reports. The system's ability to provide real-time data and detailed analytics empowers educators and administrators to make informed decisions, identify attendance trends, and implement timely interventions to support student success.

Overall, the QR Code Based Smart Online Student Attendance System represents a significant advancement over traditional attendance tracking methods, offering a reliable, efficient, and secure solution tailored to the needs of modern educational institutions.

II. LITERATURE REVIEW

Traditional attendance systems are often manual, time-consuming, and prone to errors or misuse. Recent advancements in educational technologies suggest the need for automated, secure, and real-time solutions. Inspired by intelligent systems like voice assistants, which integrate technologies such as AI, NLP, and real-time data processing, similar design principles can be applied to attendance tracking.

QR code-based systems offer a lightweight, cost-effective, and scalable solution by using existing hardware like webcams. The proposed system ensures student authentication through staff verification and generates unique QR codes for each student. These are scanned for attendance logging, accompanied by photo verification to prevent proxy entries.

Compared to biometric or RFID systems, QR-based approaches balance efficiency, affordability, and security. Literature supports the move towards such smart systems, emphasizing modular design, real-time data handling, and user role management as key factors for reliability and adoption.

III. METHODOLOGY

The QR Code Based Attendance System was developed using a modular and iterative approach. The system includes two main user roles: students and staff. Students register with academic and personal details, which are verified by staff through a secure approval workflow. Upon approval, each student is issued a unique QR code for attendance marking.

QR code scanning is done using a webcam, and attendance is logged in real time along with photo verification. The backend is built using Java and MySQL, while the frontend uses JSP, HTML, CSS, and JavaScript. Staff can monitor attendance, generate reports, and track student activity through a dashboard. The system ensures secure authentication, prevents proxy attendance, and provides a reliable, paperless attendance solution.

IV. IMPLEMENTATION

The QR Code Based Attendance System was developed using Java (Servlets), JSP, HTML, CSS, and JavaScript for the frontend, with MySQL as the backend. Students register by submitting their details and are granted access only after staff approval.

Once approved, a unique QR code is generated for each student and embedded in their ID card. Students scan this QR code via webcam to mark attendance. The system verifies the QR code, logs the timestamp, and captures a photo for verification. Staff can monitor attendance, generate reports, and view logs through a secure dashboard.

Key tools used include Apache Tomcat for server deployment, NetBeans IDE for development, and ZXing for QR code generation.

V. RESULT AND DISCUSSION

The QR Code Based Attendance System was successfully implemented and tested in a simulated academic environment. The system allowed students to register, receive approval from staff, and generate unique QR codes for attendance. During testing, QR codes were scanned using a standard webcam, and attendance was accurately recorded in real-time along with photo capture for verification.

The system displayed confirmation messages for successful scans and flagged duplicate or unauthorized attempts. Staff were able to view attendance records instantly, filter them by date and student, and generate attendance reports with ease.

1. PURPOSE: DETERMINE THE SCOPE AND OBJECTIVES OF JARVIS.

Target Audience: Academic institutions, colleges, and universities.

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-25608

47

ISSN
2581-9429
IJARSCT

Core Features: Student registration, staff approval, QR-based attendance marking, real-time photo capture, report generation.

Advanced Features: Identity verification through photo, real-time logs, admin dashboard with filtering.

Technology Stack: Java (Servlets), JSP, HTML, CSS, JavaScript, MySQL.

Hardware: Standard webcam for QR code scanning; no special devices required.

2. SYSTEM DESIGN

Objective: Build a modular, web-based attendance tracking system.

Modules:

• Student Registration
• Staff Login and Approval
• QR Code Generation
• Attendance Scanning
• Report Viewing and Exporting

3. TECHNOLOGY SELECTION

Languages & Tools:

• Java: Backend logic and servlet processing
• JSP/HTML/CSS/JS: Web interface
• MySQL: Database management
• Apache Tomcat: Deployment server
• ZXing Library: QR code generation and decoding

4. DEVELOPMENT PHASES

• Registration Module: Collects student data and stores it securely.
• Approval Workflow: Allows staff to validate student identities.
• QR Generation: Automatically assigns unique codes post-approval.
• QR Scan & Verification: Webcam scans student ID, verifies, and logs attendance with timestamp and photo.
• Reporting: Allows staff to retrieve and analyze attendance data.

5. INTEGRATION

• Seamless Workflow: Smooth integration between modules via session handling and DB queries.
• Export Options: Supports PDF/Excel report generation.
• Scalability: Designed for multi-department and multi-semester deployment.

6. TESTING AND VALIDATION

• Unit Testing: Each module (QR generation, scanning, registration) tested individually.
• Integration Testing: Checked for session management and DB connectivity.
• Performance Testing: System handled multiple scans with minimal delay.
• User Testing: Simulated students and staff used the system; feedback led to UI improvements.

7. DEPLOYMENT

• Local Deployment: Hosted on Apache Tomcat locally for campus-wide use.
• Cloud-Ready: Can be hosted on any cloud platform (e.g., AWS, Heroku) with minimal configuration.

8. MAINTENANCE AND UPDATES

• Bug Fixes: Minor login and image handling issues were resolved during testing.
• Feature Additions: Planned modules include SMS/email alerts and mobile app integration.

• Performance Tweaks: Queries optimized for fast retrieval and reporting.
• Feedback Loop: Admin feedback shaped interface improvements.

9. ETHICAL AND LEGAL CONSIDERATIONS
• Data Privacy: User data is secured; passwords stored using encryption (recommended for production).
• Access Control: Role-based access ensures only staff can approve or access sensitive data.
• Transparency: The system logs every operation, ensuring traceability of attendance records.

VI. CONCLUSION

The QR Code Based Attendance System offers a modern, efficient, and secure solution for managing student attendance in educational institutions. By combining QR code technology with a staff-approved workflow, the system ensures accuracy, prevents unauthorized access, and eliminates manual errors. Real-time monitoring and reporting features support better decision-making and academic oversight. Overall, the system enhances both administrative efficiency and student accountability.

VII. ACKNOWLEDGMENT

REFERENCES

[1]. Punch Card, available at: https://www.computerhope.com/jargon/p/punccard.htm, last accessed: 03 Jan 2020

[2]. Punch card attendance system, available at: http://www.bioenabletech.com/punch-card-attendance-system.html, last accessed: 03 Jan 2020

[3]. M. A. Abas, T. B. Tuck, and M. Dahlui, "Attendance Management System (AMS) with fast track analysis," in 2014, International Conference on Computer, Control, Informatics and Its Applications (IC3INA), 2014, pp. 35–40.

[4]. T. J. Zhi, Z. Ibrahim, and H. Aris, "Effective and efficient attendance tracking system using secret code," in Proceedings of the 6th International Conference on Information Technology and Multimedia, 2014, pp. 108–112.

[5]. S. K. Jain, U. Joshi, and B. K. Sharma, "Attendance Management System," Masters Project Report, Rajasthan Technical University, Kota.

[6]. A. Manori, N. Devnath, N. Pasi, and V. Kumar, "QR Code Based Smart Attendance System", Int. J. Smart Bus. Technol., vol. 5, no. 1, pp. 1–10, Jul. 2017.

[7]. Fadi Masalha and Nael Hirzallah, "A Students Attendance System Using QR Code", International Journal of Advanced Computer Science and Applications vol. 5, no.3, pp. 75-79, Jan. 2014.

[8]. What is a QR Code?, available at: https://www.the-qrcode-generator.com/whats-a-qr-code,last accessed: 07 Jan 2020