



AUTOMATED ATTENDANCE SYSTEM USING QR-CODE

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ABSTRACT

In today's digital world, smartphones have become an important part of daily life by making tasks quicker and easier. Attendance management in schools, colleges, and organizations is one area where technology can be very useful. This paper presents a smart attendance system based on QR code technology using mobile and web applications. Unlike traditional methods such as manual registers or RFID systems, QR codes are low-cost, easy to create, and simple to use. The proposed system includes two applications: one application generates a unique QR code using student or employee information, and the other application scans the QR code to mark attendance. Teachers or administrators use a smartphone to scan the QR code, and the attendance data is stored securely in a central database. Attendance is recorded in binary format, where '1' indicates present and '0' indicates absent, and reports can be exported in CSV or XLS format. The system also provides identity verification to reduce fake or incorrect attendance entries. Overall, this QR code-based attendance system improves accuracy, saves time, and provides an efficient solution for attendance management.

1. INTRODUCTION

Attendance is an important part of schools and colleges because it helps teachers know whether students are regular, disciplined, and active in class. Traditional attendance methods like calling names or using paper registers take a lot of time and can easily have mistakes, especially in large classrooms. These methods also allow proxy attendance, loss records, and problems in keeping data for a long time. Today, with the growth of digital technology, automated attendance systems are becoming more popular. Many methods such

as biometric systems, RFID, face recognition, and mobile apps have been used. However, some of these systems are costly, need special hardware, require maintenance, or create privacy issues. A QR-code-based attendance system is a simple and low-cost solution. In this system, each student is given a unique QR code that contains their details. The QR code is scanned using a smartphone or camera device, and attendance is automatically stored in a central database with date and time. This reduces manual work, saves time, and avoids errors. QR codes are easy to create, quick to scan, and widely used. When combined with mobile or

web applications, they help teachers generate reports, track attendance easily, and keep records digitally. This review paper studies different QR-code-based attendance systems, their working methods, advantages, limitations, and future scope, and shows how they are better than attendance methods.

2. PROSPECTIVE APPLICATION

The research on Automated Attendance System Using QR Code is developed from a digital innovation and smart education perspective. In the present academic environment, institutions are increasingly adopting automated systems to improve administrative efficiency and ensure data accuracy. The traditional method of manually recording attendance is time-consuming and prone to errors such as proxy marking and data mismanagement. From a technological perspective, integrating QR code technology offers a secure, fast, and contactless alternative for attendance management. This study views the system as a component of digital transformation in educational institutions. By incorporating QR code generation and scanning through mobile devices, the system supports real-time data recording and centralized database management. The perspective emphasizes transparency, reliability, and improved monitoring of student attendance records. It also aligns with the broader concept of smart classrooms and e-governance in education.

Table 1: Summary of previous research work of Attendance System Using Qr-Code

Authors	Data set/System Used	Sample Size	Feature / Technology Used	Technique/Method	Result/Outcome
Wellington, Luke & Laura Thomson (2016)	Web-based system	—	PHP, MySQL	Web Development Framework	Efficient database management for web applications
Nixon, Robin (2018)	Web Application Development	—	PHP, MySQL, JavaScript	Full-stack	Helps build dynamic web systems
Masalha, Fadi & Nizar Hirzallah (2014)	Student Attendance System	60+ Students	QR Code	web programming	Reduces manual attendance errors
Navin, K., Shanthini A., Venkat	Mobile Attendance	Field employees	Mobile App + QR Code	Mobile QR	Accurate tracking of field personnel

esh R. (2017)	Tracking				el attendance
Wei, Xiaolong et al. (2017)	Smart Attendance System	—	QR Code Technology	scanning	Fast and secure attendance recording

3. METHODOLOGY

The Automated Attendance System using QR Code is developed to provide a fast, accurate, and low-cost method of recording student attendance. The system methodology is based on QR code technology, database integration, and real-time data processing. First, student details such as student ID, name, and class are stored in a centralized database. A unique QR code is generated for each student using a QR code generation algorithm. The QR code encodes identification data, which acts as a digital representation of the student's identity. During attendance sessions, a camera-enabled device (mobile phone or webcam) scans the QR code presented by the student. The scanning application decodes the QR code and sends the extracted data to the backend server. The server verifies the student's identity by matching the received data with records in the database. If the student is valid and attendance has not already been marked for that session, the system records attendance along with date and time. The system architecture typically consists of three main components:

A. Frontend Interface

Used by teachers to start attendance sessions and view records.

QR Code Scanner Module – Responsible for reading and decoding QR codes.

B. Backend & Database

Handles data verification, storage, and report generation. This method ensures automation, reduces manual effort, and prevents errors associated with traditional attendance methods.

C. Analysis

The analysis of the QR Code based Automated Attendance System focuses on performance, accuracy, efficiency, and usability.

D. Accuracy

The system significantly reduces human errors that occur during manual attendance marking. Since each QR code is unique, the probability of marking attendance for the wrong student is minimize

E. Time Efficiency

QR code scanning takes only a few seconds per student, making the process much faster than roll-calling, especially in large classrooms.

F. Cost Effectiveness

Compared to biometric or RFID-based systems, QR code systems require minimal hardware, as they can operate using existing smartphones or webcams.

G. Security and Reliability

The system prevents duplicate attendance entries by checking session records. However, risks such as QR code sharing among students may exist and can be minimized using additional verification methods.

H. Data Management

Attendance data is stored digitally, making it easy to retrieve, filter, and analyze. Reports such as daily, monthly, and subject-wise attendance can be generated automatically.

I. Scalability

The system can be expanded to include more students, classes, or institutions without major infrastructure changes

4. MODELLING AND ANALYSIS

A. Model and Materials Used

System Model (Working Model of the System)
The model of the QR Code Based Automated Attendance System is designed to reduce manual work and avoid proxy attendance. The system works using a digital process where attendance is marked by scanning a QR code.

The model mainly consists of four parts:

- Admin Module – Used by teacher to generate QR code and manage attendance.
- Student Module – Students scan QR code using mobile phone
- QR Code Generation System – Creates unique QR code for each class/session.
- Database & Server – Stores attendance records securely.

Working of the Model:

- Teacher logs into the system.
- System generates a unique QR code for that lecture.
- Teacher displays QR code on screen.
- Students scan the QR code using the mobile application.
- The system verifies student details.
- Attendance is automatically stored in the database.
- Teacher can view attendance report.

Materials Used: The materials include both hardware and software components:

Category	Material / Tool Used	Material / Tool Used	Purpose
Hardware	Smartphone	Smartphone	Used by students to scan QR code
	Internet Connection	Internet Connection	Required for real-time attendance
Software	QR Code Generator	QR Code Generator	Creates unique QR codes
	Web Application	Web Application	Used by admin/teacher
	Database (MySQL/Firebase)	Database (MySQL/Firebase)	Stores attendance data
	Programming Languages (HTML, CSS, JAVASCRIPT, PHP, MYSQL)	Programming Languages (HTML, CSS, JAVASCRIPT, PHP, MYSQL)	Used to develop system
	Server	Server	Processes requests and manages data

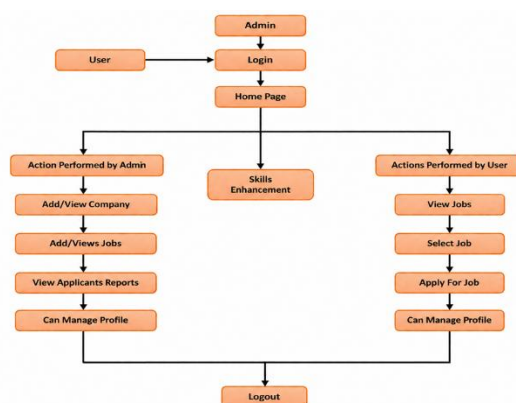


Figure 3: Flowchart of Automated Attendance System Using QR Code

5. PARAMETERIZATION

In the proposed Automated Attendance System Using QR Code, parameterization plays a crucial role in ensuring system flexibility, accuracy, and scalability. The system is designed with configurable parameters that allow institutions to modify attendance rules according to their academic requirements. The primary parameters include student identification number, QR code data structure, timestamp validation, class schedule timing, and geolocation constraints. Each student is assigned a unique identification number embedded within a dynamically generated QR code. The QR code contains encrypted information such as student ID, course code, and session details to prevent duplication and unauthorized access. Time-based parameters are incorporated to validate attendance within a predefined time

window. For example, attendance is marked only if the QR code is scanned within the scheduled lecture duration. Additionally, geolocation parameters ensure that the QR code is scanned within the authorized campus premises, reducing proxy attendance. System-level parameters such as database connectivity, authentication protocols, error tolerance limits, and QR code expiration time are also configurable. These parameters allow administrators to control system security, access levels, and reporting mechanisms.

Through effective parameterization, the system achieves higher reliability, improved security, and adaptability across different educational institutions. Finally, Database Configuration Parameters control how attendance data is stored, retrieved, and reported. These parameters ensure reliable data synchronization, automated report generation, and secure record maintenance.

Through effective parameterization, the Automated Attendance System achieves improved security, operational efficiency, and adaptability across educational institutions.

6. CHALLENGES AND FUTURE SCOPE

The Automated Attendance System using QR Code is based on the concept of digital authentication and real-time data management. It utilizes Quick Response (QR) code technology, which stores encoded information that can be scanned using a smartphone camera. Although this system improves efficiency and reduces manual errors, several theoretical and practical challenges exist, which also define its future scope. One of the major challenges is QR code duplication and proxy attendance. According to authentication theory in information security, a system that relies on single-factor verification (only QR scanning) is vulnerable to misuse. Students may share QR screenshots, leading to false attendance records. To overcome this limitation, the future scope includes integrating multi-factor authentication methods such as biometric verification (fingerprint or facial recognition) to enhance system reliability. Another significant issue is network dependency. The system operates on real-time database connectivity, which follows the client-server model. In areas with poor internet connectivity, attendance synchronization may fail. Future improvements can include offline data caching with automatic cloud synchronization once the connection is restored. Data security and privacy are also important theoretical concerns. Since attendance records are stored digitally, the system must follow data protection principles such as confidentiality, integrity, and availability (CIA triad model). Future developments can implement encryption techniques and secure cloud storage systems to protect sensitive student data. From a system integration perspective, compatibility with

institutional ERP or Learning Management Systems (LMS) can be complex. However, future scope includes API-based integration with platforms like Moodle and Google Classroom for centralized academic monitoring. Another challenge is device compatibility and hardware limitations. According to system design theory, performance depends on input device quality (camera resolution and processing speed). Future advancements may include dedicated mobile applications optimized for Android and iOS platforms to ensure smoother performance. Furthermore, scalability remains a concern when implementing the system in large institutions. As per database management theory, increased user load can affect server response time. Future enhancements may involve cloud-based distributed architecture to support multi-campus deployment efficiently. In conclusion, while the QR Code-based Attendance System significantly improves accuracy, transparency, and time efficiency compared to traditional manual methods, it requires continuous technological upgrades in authentication, security, and scalability. Addressing these challenges through advanced technologies such as biometrics, cloud computing, and artificial intelligence will strengthen the system and expand its applicability in modern educational institutions.

CONCLUSION

The review of various studies shows that the Automated Attendance System using QR Code is a smart and efficient method for managing attendance in educational institutions. Traditional methods of taking attendance manually are time-consuming, prone to human errors, and difficult to manage for large numbers of students. The QR code-based system solves these problems by making the process fast, digital, and more reliable. This system allows students to mark their attendance by scanning a QR code using their smartphones. The attendance data is stored automatically in a database, which reduces paperwork and makes record keeping easier. Teachers can generate attendance reports quickly, and institutions can monitor student attendance more effectively. Compared to biometric and RFID systems, the QR code system is more affordable and easier to implement because it does not require expensive devices. However, some challenges exist, such as the need for internet access and the possibility of proxy attendance. These issues can be reduced by using secure features like time-limited QR codes or authentication methods.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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REFERENCES

- [1] Welling, Luke, and Laura Thomson. PHP and MySQL Web Development. Addison Wesley, 2016.
- [2] Nixon, Robin. Learning PHP, MySQL & JavaScript. O'Reilly Media, 2018.
- [3] Phpqr code Documentation." Source Forge, <https://sourceforge.net/projects/phpqr code/>. Accessed 9 May 2025.
- [4] Garcia, M., et al. "QR Code-Based Attendance Systems in Universities." Educational Technology Review, 2019.
- [5] Masalha, Fadi, and Nizar Hirzallah. "A Students Attendance System Using QR Code." International Journal of Advanced Computer Science and Applications, vol. 5, no. 3, 2014, pp. 75–79. CiteSeerX, doi:10.14569/IJACSA.2014.050314.
- [6] Nuhi, Arlind, et al. "Smart Attendance System Using QR Code." 2020 9th Mediterranean Conference on Embedded Computing (MECO), IEEE, 2020, pp. 1–4. IEEE Xplore, doi:10.1109/MECO49872.2020.9134344.
- [7] Wei, Xiaolong, et al. "QR Code Based Smart Attendance System." International Journal of Smart Business and Technology, vol. 5, no. 2, 2017, pp. 1–10. Academia.edu, www.academia.edu.
- [8] Navin, K., A. Shanthini, and R. Venkatesh. "A Mobile Based Smart Attendance System Framework for Tracking Field Personals Using a Novel QR Code Based Technique." 2017 International Conference on Smart Technologies for Smart Nation (SmartTechCon), IEEE, 2017, pp. 1105–1109. IEEE Xplore, doi:10.1109/SmartTechCon.2017.8358553.
- [9] Patel, A., A. Joseph, S. Survase, and R. Nair. "Smart Student Attendance System Using QR Code." 2019 International Conference on Advances in Computing, Communication and Control (ICAC3), 2019. SSRN, www.ssrn.com/abstract.
- [10] Talip, B. A., and M. Z. Zulkifli. "Mobile Attendance System Using QR Codes Technology." Journal of Computing Technologies and Creative Content, vol. 3, no. 1, 2018, pp. 10–15. Academia.edu, www.academia.edu.
- [11] Rabu, S. N. A. "The Design and Implementation of Student Attendance Tracking System Using QR Code Card." Proceedings of the eLearning and Software for Education Conference, 2019, pp. 250–256. CEEOL, www.ceeol.com/search/article-detail.
- [12] Santhoshi, T. S., A. Triveni, A. D. P. Reddy, and A. Srilatha. "QR Code Based Attendance System." International Journal of Innovative Technology and Creative Engineering (IJITCE), vol. 14, no. 3, 2024, pp. 45–50. ijitce.org, www.ijitce.org
- [13] Felix, A. Y., S. Vignesh, and M. J. Andrew. "Mobile Application and QR Code for Attendance System." AIP Conference Proceedings, vol. 2900, 2024, article no. 050013. AIP Publishing, doi:10.1063/5.0212345
- [14] Al Amin, I. H., V. Lusiana, B. Hartono, and M. S. Manalu. "QR Code-Based Attendance System for Contact Tracking Post-Pandemic." CogITo Smart Journal, vol. 10, no. 1, 2024, pp. 22–30. cogito.unklab.ac.id, www.cogito.unklab.ac.id/article/view
- [15] International Journal of Scientific and Research Publications, vol. 11, no. 7, July 2021, ISSN 2250-3153."
- [16] Talip, Bazilah A., and Mohammad Zulfikri Zulkifli. "Mobile Attendance System Using QR Codes Technology." Journal of Computing Technologies and Creative Content, vol. 3, no. 1, July 2018, pp. 1–3. JTeC, e-ISSN: 2550-1550.
- [17] Ettah, Emmanuel Benjamin, and Ofut Ogar Tumenayu. "Smart Phone Attendance Management System for Universities Using Embedded QR ID Card." IOSR Journal of Applied Physics (IOSR-JAP), vol. 16, no. 3, ser. 2, May–June 2024, pp. 1–6. IOSR Journals, doi: 10.9790/4861-1603020106.
- [18] 2nd International Conference on Advances in Science & Technology (ICAST-2019), K. J. Somaiya Institute of EnginInformation Technology, University of Mumbai, Maharashtra, India, 2019.
- [19] ASQR Team, Nesma Abd El-Mawla, and Mohamed Ismael. "Smart Attendance Control System Using QR-Code." International Journal of Scientific and Research Publications, vol. 11, no. 7, July 2021, pp. 577–582. DOI: 10.29322/IJSRP.11.07.2021.p11577.
- [20] Kumar, K. Kiran, et al. "Implementing a QR-Based Attendance System." Journal of Cardiovascular Disease Research, vol. 11, no. 11, 2020, pp. 1–1. ISSN: 0975-3583, 0976 2833. G V R & S College of Engineering & Technology, Guntur, AP.