DESIGN AND IMPLEMENTATION OF A SECURE QR CODE ATTENDANCE SYSTEM FOR INSTITUTIONS

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ABSTRACT

Traditional attendance management systems are often manual, time-consuming, and prone to errors or manipulation. In response to these challenges, this paper presents the design and implementation of a secure QR code-based attendance system tailored for institutional environments such as schools, colleges, and corporate workplaces. The proposed system leverages QR code technology to enable quick and contactless attendance marking through individual scanning via smartphones or institution-managed devices. To enhance security and prevent proxy attendance, the system includes features such as time-sensitive dynamic QR codes, user authentication, and real-time logging into a centralized database. The solution is low-cost, scalable, and integrates easily with existing institutional infrastructure. Experimental results demonstrate improved efficiency, accuracy, and data security, making it a reliable alternative to conventional attendance methods.

I.INTRODUCTION

Attendance tracking is an essential part of institutional management, whether in educational institutions or workplace settings. However, traditional attendance systems—such as manual roll calls, paper registers, or biometric readers—are often inefficient, susceptible to errors, and difficult to scale. Moreover, concerns related to hygiene, especially in the post-pandemic era, have increased the demand for contactless and automated attendance systems.

With the widespread availability of smartphones and the increasing adoption of digital tools in education and professional environments, QR code technology has emerged as a convenient and cost-effective solution for identity verification and attendance logging. QR codes are fast, secure, and easy to generate, making them an ideal medium for streamlining attendance processes.

This paper introduces a QR code-based attendance management system that enables users to scan dynamically generated codes to mark their presence. The system ensures secure attendance logging by verifying user credentials and timestamps, and it stores data in a centralized database accessible to administrators. The goal is to develop a system that not only enhances efficiency and user experience, but also reduces instances of fraudulent attendance and supports seamless integration into existing institutional ecosystems.

II.LITERATURE SURVEY

The implementation of QR codes for attendance management has gained traction in recent years, with several studies highlighting their benefits over traditional methods. Research indicates that QR codes can significantly reduce the time required for attendance taking while minimizing the potential for human error (Sukanya et al., 2020). By eliminating the need for manual record-keeping, institutions can allocate more time to educational activities and enhance overall productivity.

Several existing systems have utilized QR codes for attendance tracking, demonstrating

successful outcomes in educational settings (Jain et al., 2019). These systems typically incorporate mobile applications that allow users to scan codes, with backend databases to securely store attendance records. Some implementations even provide analytics tools for tracking attendance trends and patterns, aiding educators in identifying students who may require additional support.

Despite the advantages, challenges remain in the widespread adoption of QR-based systems. Issues related to device compatibility, internet connectivity, and user training must be addressed to ensure effective implementation (Kumar et al., 2021). Additionally, considerations regarding data privacy and security are paramount, as attendance records can contain sensitive information.

In summary, the literature suggests that QR-based attendance systems present a viable solution for improving attendance tracking in various contexts. By leveraging the convenience of mobile technology and QR codes, these systems can enhance accuracy, efficiency, and data analysis capabilities.

III. PROPOSED SYSTEM

This section describes the various tools and techniques used in creating an online attendance system using QR code and all the operation of the system. A QR Code is a two-dimensional barcode that is readable by smartphones and allows the encoding of over 4000 characters in a two-dimensional barcode.

QR Codes may be used to display text to the user, to open a URL, save a contact to the address book or to compose text messages. "QR Code" is a registered trademark of Denso Wave Incorporated. A QR code can be read by almost all mobile phones and webcams in web browser [8].

The proposed model (Figure 1) is divided into three modules: the first module is the module of the administrators, which consists of 3 types: admin, head of study program and administrator of the study program. The role of the main Administrator is to backup the system and database, edit it, manage and insert professors, students, faculty, study programs, as well as create heads of study programs and administrators for the respective study programs. On the other hand, the head of the study program has the opportunity for the semester to make a schedule for the professors, by setting the time when the class will be held, adding departments to the respective program, and the administrator of the study program is responsible to select the courses that the respective student should attend during that semester.

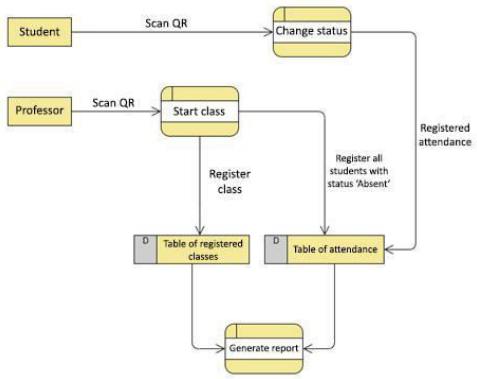

Fig 1. Proposed Model Architecture

IV.CONCLUSION

The proposed QR code-based attendance system offers a secure, efficient, and scalable solution for modern institutional needs. By replacing manual or biometric methods with a contactless scanning system, institutions can significantly reduce administrative overhead, eliminate proxy attendance, and improve record accuracy.

The use of dynamic QR codes and secure login mechanisms adds an essential layer of security, ensuring that attendance cannot be manipulated. The centralized database and real-time tracking features further enable administrators to monitor attendance trends and generate reports with ease.

In conclusion, the system addresses the core challenges of traditional attendance methods while aligning with the growing demand for digital transformation in education and organizational management. Future enhancements may include facial recognition integration, mobile app support, and advanced analytics for predictive attendance behavior.

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