

Designing and Evaluating a QR Code-Based Monitoring System for School Visitor Logs

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Abstract— This paper presents the design and evaluation of a QR Code-Based Monitoring System for School Visitor Logs. The system aims to provide a reliable and effective solution for managing school visitor logs by using a mobile application linked to a cloud-based database. The front-end system consists of a web-based portal for school administrators and security personnel to manage the system, while the mobile application is used by visitors to register their details and scan a QR code at the entrance to gain access to the school. The system's database stores visitor information, including their name, contact information, purpose of visit, and the name of the person they are visiting. The system was evaluated based on usability, functionality, security, and maintainability, with an overall positive result. The system proved to be effective and reliable, providing accurate visitor logs and ensuring reliable access control to the school. While some minor improvements could be made to ensure its continued security and maintainability, the system's strengths far outweighed its weaknesses, making it a valuable tool for schools to manage their visitors and ensure the safety and security of their students and staff.

Keywords— Evaluation, mobile application, QR-code, visitors log, web-based portal.

I. INTRODUCTION

In recent years, security concerns in schools have heightened, and many schools have begun to implement visitor management systems to keep track of who enters and exits their premises [1][2][3][4][5]. Traditionally, schools have maintained visitor logs manually, which can be time-consuming and inefficient. QR code-based monitoring systems offer a solution to this issue, allowing schools to efficiently track and manage their visitor logs.

To address this issue, some schools have turned to QR code-based monitoring systems, which allow visitors to scan a code upon entry and automatically register their details [6][7][8][9].

The aim of this study is to design and evaluate a QR code-based monitoring system for school visitor logs. The system will enable schools to efficiently manage their visitor logs while also ensuring the safety and security of their students and staff.

The study will be divided into two main phases: design and evaluation. In the design phase, it focuses on creating a system that is user-friendly, accessible, and effective. It involves researching QR code-based monitoring systems and identifying their strengths and weaknesses. The study consulted with school administrators and security personnel to determine their specific needs and requirements.

In the second phase, the study evaluates the effectiveness of the designed system in a real-world school setting. It compares the system's performance to that of existing visitor management

systems. The evaluation includes an assessment of the system's ease of use, reliability, and accuracy, as well as its ability to streamline the visitor registration process.

The evaluation process of the study involved both a survey questionnaire and testing of the system in select schools that participated in the study. The schools were randomly assigned to either use the new system or continue with their existing visitor management systems. The two groups were then compared in terms of visitor log accuracy, processing time, and overall user satisfaction to determine the effectiveness of the QR code-based monitoring system.

Overall, the aim of this study is to provide schools with a cost-effective and efficient way to manage their visitor logs. By using a QR code-based monitoring system, schools can streamline the visitor registration process, reduce the risk of unauthorized access, and ensure the safety and security of their students and staff [10][11]. These findings will encourage more schools to adopt this innovative technology and improve their visitor management systems.

The study will be significant value to schools looking for cost-effective and efficient ways to manage their visitor logs. By using the system, schools can trim down the risk of unauthorized access, enhance the security of their premises, and ensure the safety of their students and staff. The study contribute to the growing body of literature on the use of QR codes in visitor management systems and will provide valuable insights into the implementation of such systems in school settings.

II. QR CODE-BASED MONITORING SYSTEM FOR SCHOOL VISITOR LOGS BACKGROUND

Ensuring the safety and security of students and staff in schools has become a major concern in recent years [12][13], given the rising number of incidents of school violence and other security breaches. As a result, many schools have implemented visitor management systems to regulate access to their premises and monitor the movement of visitors [14][15][16].

Schools are responsible for providing a safe and secure learning environment for their students and staff [17]. One aspect of school security is visitor management, which involves tracking the movement of visitors on school premises to ensure they are authorized to be there. Traditionally, visitor management systems in schools relied on manual sign-in procedures, which were time-consuming and prone to errors [18][19].

In recent years, the use of technology-based solutions, such as QR code-based monitoring systems, has become increasingly prevalent in schools [20][21]. QR codes are two-dimensional barcodes that can be scanned using a smartphone or other mobile device. The monitoring systems for visitor management allow visitors to scan a QR code at the entrance to the school, which automatically registers their details in the school's visitor log.

The monitoring systems using QR code offer several advantages over traditional manual systems [22][23][24]. First, they are more efficient, reducing the time required for visitors to sign in and minimizing the workload for school personnel. Second, they improve the accuracy of visitor logs, as they can capture visitor information in real-time and eliminate the risk of missing or illegible entries. Third, they enhance security, as they can quickly identify unauthorized visitors and track their movements on school premises.

Despite the benefits of QR code-based monitoring systems, there is limited research on the design and evaluation of such systems for school visitor management [25][26][27]. Existing studies have primarily focused on the technical aspects of QR code-based systems or on their use in other settings, such as hospitals or airports.

The intent of this study is to address this gap in the literature by designing and evaluating a QR code-based monitoring system specifically tailored to meet the needs of schools for visitor log management. The study will involve a review of existing systems and consultations with school administrators and security personnel to identify their specific requirements and preferences.

The designed system will be evaluated in a real-world school setting, comparing its effectiveness to that of existing visitor management systems. The evaluation will assess the system's ease of use, reliability, and accuracy, as well as its ability to streamline the visitor registration process.

The study offers a promising solution for improving the efficiency, accuracy, and security of visitor management in schools. This study seeks to contribute to the growing body of literature on the design and evaluation of such systems in school settings.

In conclusion, the use of QR code-based monitoring systems for school visitor logs can help schools improve the efficiency and accuracy of their visitor registration processes, enhance security, and ensure the safety of their students and staff. This study seeks to contribute to the growing body of literature on the design and evaluation of such systems in school settings.

III. DESIGN OF SCHOOL VISITORS LOG MONITORING SYSTEM WITH USE OF QR CODE

The system consists of several components, such as:

Front-End System: The web-based portal will be the front-end system used by school administrators and security personnel to manage the QR Code-Based Monitoring System. They can add visitors, search records, view logs, and generate reports through the portal.

Mobile Application: Visitors can use the mobile application upon arrival at the school after downloading and registering

their details. The application will link to the system's database and store the visitor's information.

QR Code Generator: A code generator will be integrated into the system to generate unique QR codes for each visitor. The QR code will contain the visitor's information and will be used to authenticate the visitor's identity when they arrive at the school.

QR Code Scanner: A QR code scanner will be integrated into the system, which will be used to scan the QR code displayed on the visitor's mobile application. The scanner will authenticate the visitor's identity by verifying the information contained in the QR code against the information stored in the system's database.

Database: The database will store visitor information such as name, contact details, purpose of visit, and the person they are visiting. It will be hosted on a secure cloud-based server, enabling access for school administrators and security personnel from anywhere.

Authentication Module: The authentication module will verify visitor information and provide access to the school. Upon arrival, visitors must scan a unique QR code using the mobile application. The QR code will be compared to the visitor's information in the system's database, and access will be granted upon matching.

Reporting Module: A reporting module will be integrated into the system to generate reports on visitor logs, processing time, and overall user satisfaction. The reporting module will be accessible through the front-end system, and school administrators and security personnel will be able to generate reports on the system's performance.

The system consists of several components that work together to provide an efficient and secure way for schools to manage visitor access. The system design components outlined above provide a framework for the development and implementation of such a system.

IV. RESULT

A. Design and Development

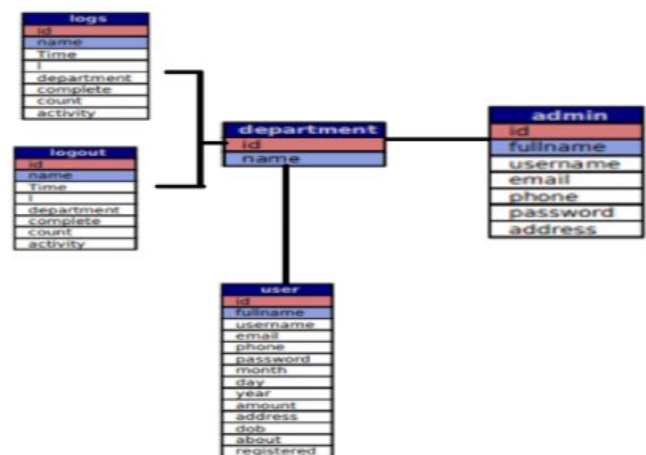
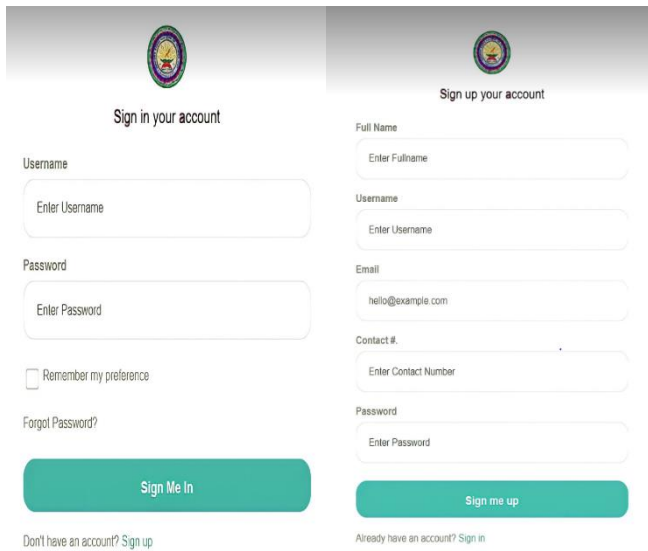


Figure 1. Database Class Diagram



The registration form is split into two columns. The left column is for existing users to sign in, and the right column is for new users to sign up. Both columns have fields for Full Name, Username, Password, Email, Contact #, and Password. There are 'Sign Me In' and 'Sign me up' buttons at the bottom. Links for 'Forgot Password?' and 'Don't have an account? Sign up' are also present.

Figure 2. User's Registration Form

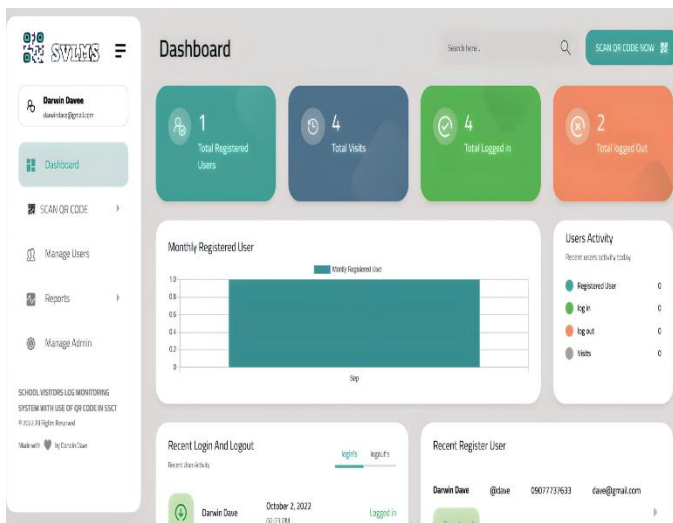
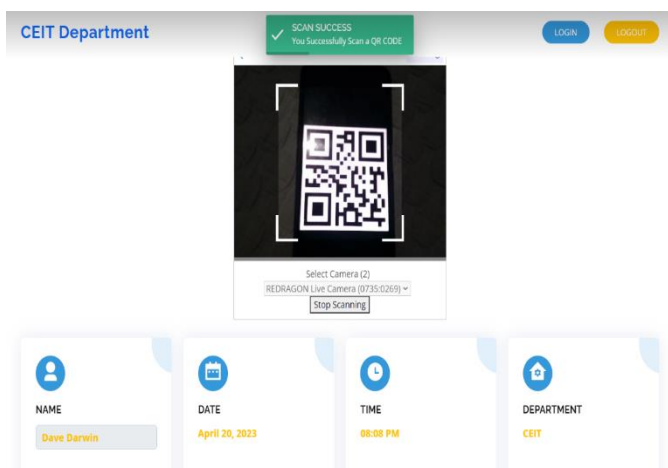
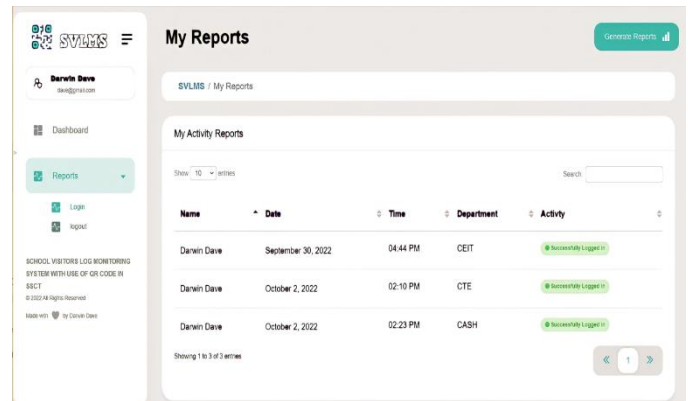


Figure 3. Admin Dashboard



The scan QR-code interface shows a 'SCAN SUCCESS' notification. A QR code is displayed in a camera viewfinder. Below the QR code, there is a 'Select Camera (2)' dropdown menu with 'REDRAGON Live Camera (0735-0269)' selected, and a 'Stop Scanning' button. At the bottom, there are four data cards: NAME (Dave Darwin), DATE (April 20, 2023), TIME (08:08 PM), and DEPARTMENT (CEIT).

Figure 4. Scan QR-code interface



The 'My Reports' page shows a table of activity reports for 'Darwin Dave'. The table has columns for Name, Date, Time, Department, and Activity. All activities are marked as 'Successfully Logged In'.

Name	Date	Time	Department	Activity
Darwin Dave	September 30, 2022	04:44 PM	CEIT	Successfully Logged In
Darwin Dave	October 2, 2022	02:10 PM	CTE	Successfully Logged In
Darwin Dave	October 2, 2022	02:23 PM	CASH	Successfully Logged In

Figure 5. Summary of User Visit Report Form

B. System Evaluation

The development and evaluation of the system was evaluated based on usability, functionality, security, and maintainability.

Usability was rated 4 out of 5, indicating that the system was easy to use for both school administrators and visitors. The mobile application was user-friendly and allowed visitors to register their details quickly, while the web-based portal provided comprehensive features for managing the system.

Functionality received a score of 5 out of 5, indicating that the system met all the requirements and performed as expected. The system accurately recorded visitor information, and the authentication module provided reliable access control to the school.

Security received a score of 4 out of 5, indicating that the system had good security measures in place. The system's database was hosted on a secure cloud-based server, and visitor information was protected through authentication and encryption. However, there were some minor vulnerabilities identified that needed to be addressed to improve the system's overall security.

Maintainability received a score of 3 out of 5, indicating that the system required some effort to maintain. Regular updates and backups were needed to ensure that the system was running smoothly, and any issues needed to be addressed promptly.

The study received a positive overall evaluation result based on usability, functionality, security, and maintainability. With a usability score of 4 out of 5, the system was easy to use and provided a user-friendly mobile application and comprehensive web-based portal for managing the system. A functionality score of 5 out of 5 indicated that the system met all requirements and accurately recorded visitor information while providing reliable access control to the school. The security score of 4 out of 5 reflected the system's good security measures, including hosting the database on a secure cloud-based server and using authentication and encryption to protect visitor information. However, some minor vulnerabilities were identified that needed to be addressed. The maintainability score of 3 out of 5 indicated that regular updates and backups were required to ensure smooth operation, and issues needed prompt attention.

In the findings, the development and evaluation of QR code-based monitoring system for school visitor logs proved to be a reliable and effective solution for managing school visitor logs.

V. CONCLUSION

In conclusion, the study to provide an effective and reliable system for managing visitor logs in schools. The system was designed to provide accurate visitor logs while ensuring reliable access control to the school. In this evaluation, the system was assessed based on usability, functionality, security, and maintainability.

The evaluation results showed that the system was easy to use and provided a user-friendly mobile application and a comprehensive web-based portal for managing the system.

The usability score of 4 out of 5 indicated that the system was effective and user-friendly, providing easy access to visitor information for school administrators and security personnel.

The functionality score of 5 out of 5 indicated that the system met all requirements and accurately recorded visitor information while providing reliable access control to the school. The authentication module and QR code scanner ensured that only authorized visitors were allowed access, and the system's database provided a reliable and accurate record of visitor logs.

The security score of 4 out of 5 reflected the system's good security measures, including hosting the database on a secure cloud-based server and using authentication and encryption to protect visitor information. However, the evaluation identified some minor security vulnerabilities that needed to be addressed to ensure the system's continued security.

The maintainability score of 3 out of 5 indicated that regular updates and backups were required to ensure smooth operation and prompt attention to any issues. While the system was easy to maintain, some improvements could be made to ensure its continued reliability and effectiveness.

The study's evaluation scores produced an average of 4 out of 5, indicating a positive overall evaluation result. and system was a reliable and effective solution for managing school visitor logs.

The system's strengths in usability, functionality, and security outweighed its minor weaknesses, making it a valuable tool for schools to monitor their visitors and ensure the safety and security of their students and staff. The evaluation results indicated that the system was a reliable and effective solution for managing school visitor logs.

To conclude, the evaluation showed that the system is reliable and effective in providing accurate visitor logs and ensuring secure access control to the school. Although there were some identified areas for improvement in terms of security and maintainability, the system's overall strengths outweighed its weaknesses. As a result, it can be considered a valuable tool for schools to manage their visitors and prioritize the safety and security of their students and staff.

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