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QR-Based Smart Visitor Access and Security Monitoring Platform for Corporate Industry

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Abstract- ***The QR-Based Smart Visitor Access and Security Monitoring System is designed to automate and enhance visitor management in corporate environments. Traditional visitor handling methods are manual, time-consuming, and prone to security risks. This system introduces a digital approach where visitors register through a secure online form. An OTP-based email verification ensures authenticity of user details. Visitors are required to upload a government ID and capture a live photo for identity validation. Upon successful verification, a unique QR code is generated for each visitor. This QR code acts as a digital entry pass and is securely encrypted to prevent tampering. At the entry point, security personnel scan the QR code using a web-based scanner. The system records real-time entry and exit timestamps of visitors. An admin dashboard provides complete visibility of visitor data and status. It also includes reporting features with export options such as CSV, Excel, and PDF. The system improves efficiency by reducing manual effort and waiting time. It enhances security through authentication and real-time monitoring. Additionally, it ensures accurate record maintenance and easy data retrieval. This solution is scalable and can be implemented in offices, industries, and institutions. Overall, the system provides a smart, secure, and efficient visitor management solution.***

I. INTRODUCTION

In modern corporate environments, efficient and secure visitor management is essential. Traditional manual systems are time-consuming, error-prone, and lack real-time tracking and proper identity verification. To overcome these issues, a QR-Based Smart Visitor Access and Security Monitoring System is developed. It digitizes the process with online registration, OTP verification, ID upload, and photo capture for authentication. A unique QR code is generated as a digital entry pass, which is scanned for entry and exit. The system records real-time data and provides an admin dashboard for monitoring and reporting. Overall, it improves security, efficiency, and scalability in visitor management.

LITERATURE REVIEW

Visitor management systems have evolved from manual methods to digital solutions. Traditional paper-based systems were inefficient, error-prone, and lacked real-time tracking and security. Modern systems use databases, QR codes, and authentication methods like OTP, ID proof, and photo capture to improve reliability. Web-based platforms and dashboards enable real-time monitoring and reporting. However, some systems still lack complete security and end-to-end functionality. The proposed system addresses these gaps by integrating QR-based access, authentication, and real-time tracking for a secure and efficient solution.

II. SYSTEM OVERVIEW

2.1 EXISTING SYSTEM

Traditional visitor management systems are manual, time-consuming, and prone to errors. They lack proper identity verification, real-time tracking, and secure data management.

2.1.1 LIMITATIONS IN EXISTING SYSTEM

1.Manual Data Entry Errors: Manual recording of visitor details often leads to incorrect or incomplete information due to human mistakes.

2.Lack of Real-Time Tracking: There is no proper system to monitor visitor entry and exit in real time, making it difficult to track their presence

3.No Identity Verification:Existing systems do not verify visitor identity through OTP, ID proof, or photo validation, leading to security risks.

4.Data Management Issues:Maintaining physical records is inefficient, and retrieving past visitor data is time-consuming and difficult

2.1.2 DRAWBACKS OF THE EXISTING SYSTEM

1.Time-Consuming Process:Manual registration increases waiting time at entry points, causing inconvenience to visitors and staff.

2.Low Security:Unauthorized visitors can easily gain access due to lack of proper authentication mechanisms.

3.No Automation:Absence of digital systems results in increased workload for security personnel and administrative staff.

4.Lack of Reporting and Analytics:Existing systems do not provide automated reports or insights, making analysis and decision-making difficult.

2.2 NEED FOR NEW SYSTEM

1.Limitations of Manual Systems: Traditional visitor management using registers is slow, error-prone, and inefficient for handling large volumes of visitors.

2.Lack of Security and Verification: Existing systems do not verify visitor identity properly, increasing the risk of unauthorized access.

3.Need for Real-Time Monitoring: Organizations require systems that can track visitor entry and exit in real time for better security control.

4.Automation and Efficiency: A digital system is needed to reduce manual workload and improve the speed of visitor processing.

5.Centralized Data Management: A new system should store and manage visitor data digitally for easy access, reporting, and analysis.

2.3 PROPOSED SYSTEM

The proposed system introduces a QR-Based Smart Visitor Access and Security Monitoring System to automate and secure visitor management, providing a complete digital solution from registration to exit tracking.

Key features of the proposed system:

1.QR-Based Access Control: Each visitor is issued a unique QR code used for secure entry and exit scanning.

2.OTP and Identity Verification: Visitor details are validated using email OTP, ID proof upload, and photo capture.

3.Real-Time Tracking: The system records entry and exit time instantly, ensuring accurate monitoring.

4.Admin Dashboard: Provides centralized control with visitor details, status tracking, and report generation.

5.Efficient and Scalable System: The web-based system reduces manual work and can be easily deployed in corporate environments.

2.3.1 FEATURES

QR-Based Access Control: Each visitor is provided with a unique QR code that is scanned at entry and exit points for secure access.

OTP and Identity Verification: The system verifies visitors using email OTP, ID proof upload, and photo capture to ensure authenticity.

Real-Time Entry and Exit Tracking: Visitor movements are recorded instantly, providing accurate monitoring of entry and exit time.

Admin Dashboard Monitoring: An admin panel displays visitor details, status, and reports for easy management and control.

Digital Data Storage and Reporting: All visitor data is stored digitally and can be exported as reports for analysis and record-keeping.

III. SYSTEM ANALYSIS

Analysis of Existing System: Traditional visitor systems are manual, lack security, and do not support real-time tracking or data management.

Proposed System Analysis: The proposed system automates visitor management using QR codes, OTP verification, and real-time monitoring, improving efficiency and security.

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3.1 FEASIBILITY STUDY

3.1.1 ECONOMICAL FEASIBILITY

Low Development Cost: Built using open-source technologies like Python, Flask, and SQLite, reducing overall cost.

Minimal Hardware Requirement: The system works on standard computers without the need for expensive hardware.

Reduced Operational Cost: Automation reduces manual work and long-term maintenance costs.

3.1.2 TECHNICAL FEASIBILITY

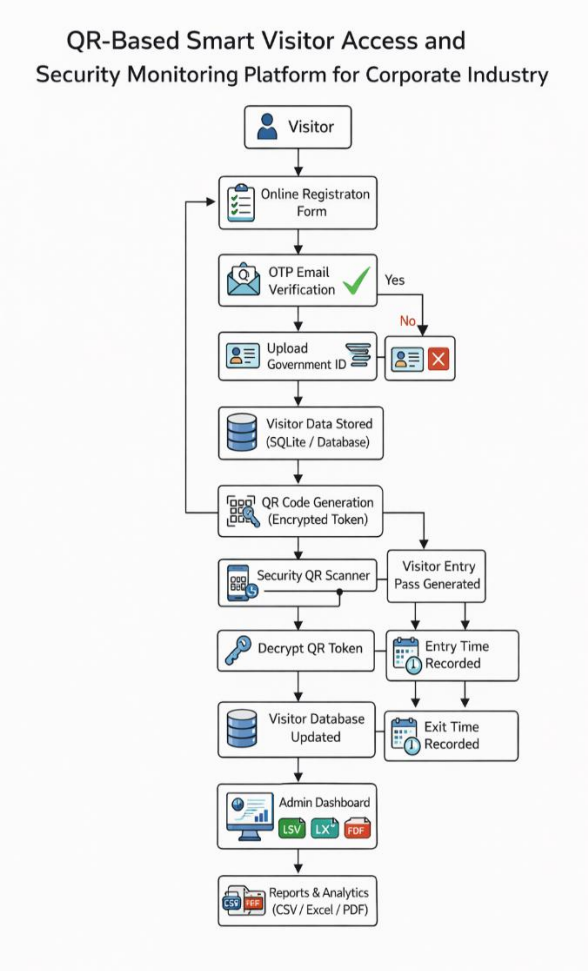
Use of Reliable Technologies: The system uses stable technologies like Flask, HTML, CSS, and JavaScript.

Easy Implementation: Simple architecture makes the system easy to develop, deploy, and maintain.

Real-Time Processing: Supports real-time QR scanning and instant data updates for efficient monitoring.

3.1.3 SOCIAL FEASIBILITY

Improved Security: Ensures safe access through OTP, ID proof, and QR verification.
User Trust: Provides reliable monitoring and accurate visitor records.
Time-Saving: Reduces waiting time with digital registration and QR scanning.
Security Awareness: Promotes safe access and identity verification practices.
Organizational Efficiency: Improves management and security standards.
Data Safety: Ensures secure storage and easy retrieval of visitor data.
Better Experience: Offers a quick and smooth entry process for visitors..



3.2 TABLE DESIGN

Stores all visitor details, registration data, and entry/exit records for monitoring and management.

Visitor Table

Field Name	Type	Description
id	Integer	Unique visitor ID
name	String	Visitor name
email	String	Visitor email ID
phone	String	Contact number
purpose	String	Purpose of visit
id_proof	String	Uploaded ID proof path
photo	String	Captured photo path
qr_code	String	Generated QR code data
entry_time	DateTime	Entry timestamp
exit_time	DateTime	Exit timestamp
status	String	Visitor status (Pending/Approved/Exited)

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Table Description
1.id (Integer): Unique identifier for each visitor.
2.name (String): Stores the full name of the visitor.
3.email (String): Used for OTP verification and communication.
4.phone (String): Contact number of the visitor.
5.purpose (String): Reason for visiting the organization.
6.id_proof (String): Path of uploaded identity document.
7.photo (String): Path of captured visitor image.
8.qr_code (String): Unique QR code generated for access.
9.entry_time (DateTime): Records the time of entry.
10.exit_time (DateTime): Records the time of exit.
11.status (String): Indicates current visitor state (active/completed).

3.3 REPORT GENERATION
The system provides an efficient report generation feature to monitor visitor activities and improve management.

User Activity Reports: Displays visitor details including entry time, exit time, and purpose of visit for tracking.

Visitor Logs: Maintains records of all visitors with complete information for security and auditing.

Real-Time Dashboard Reports: Shows current visitor status, active entries, and overall system activity.

QR Scan Reports: Records all QR scan actions including successful entry and exit validations.
Exportable Reports: Reports can be downloaded in formats like CSV, Excel, and PDF for documentation and analysis

IV. SYSTEM IMPLEMENTATION

The system implementation phase involves developing and integrating all modules required for the Visitor Management System. Each module is designed to handle specific functionalities such as registration, verification, QR generation, and monitoring.

4.1 MODULE DESCRIPTION
The main modules of the system are as follows:
Visitor Registration Module: Allows visitors to enter their details through an online form.

OTP Verification Module: Verifies visitor identity using email-based OTP authentication.

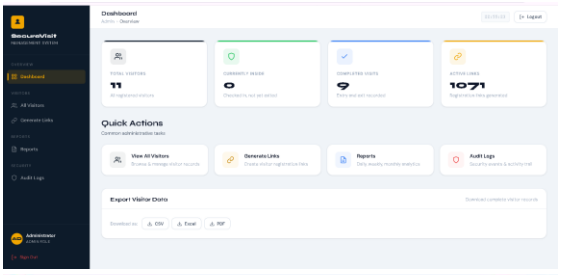
ID Upload and Photo Capture Module: Enables uploading ID proof and capturing live photo for validation.

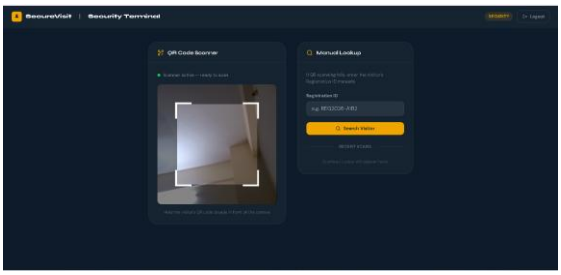
QR Code Generation and Scanning Module: Generates a unique QR code for each visitor and scans it at entry/exit points.

Admin Dashboard and Reporting Module: Provides a centralized interface to monitor visitors and generate reports.

V. SCREENSHOTS

This section presents key screenshots of the QR-Based Smart Visitor Access and Security Monitoring System, highlighting the main functionalities such as visitor registration, OTP verification, ID upload, QR code generation, scanning process, admin dashboard, and report generation.





VI. CONCLUSION

The QR-Based Smart Visitor Access and Security Monitoring System successfully provides a modern solution for managing visitors in a secure and efficient manner. The system replaces traditional manual methods with a fully digital process,

reducing time, errors, and administrative workload. By integrating OTP verification, ID validation, and photo capture, it ensures reliable visitor authentication. The use of QR codes enables fast and secure entry and exit tracking. Real-time monitoring through the admin dashboard improves visibility and control over visitor activities. The system also supports report generation, making data management and analysis easier. Overall, the system enhances security, improves efficiency, and provides a better user experience. In future, the system can be further improved by adding features like SMS OTP, cloud deployment, and advanced analytics.

Key Achievements

1.Successful Implementation of QR-Based Visitor System:
Developed a complete digital visitor management system using QR codes for secure entry and exit.

2.Visitor Authentication and Verification: Implemented OTP-based email verification along with ID proof upload and photo capture for secure identity validation.

3.Real-Time Visitor Tracking: Enabled real-time monitoring of visitor entry and exit, improving security and transparency.

4.Admin Dashboard and Reporting: Designed an interactive dashboard to manage visitor data and generate reports in multiple formats.

5.Automation of Visitor Management: Reduced manual work by automating registration, verification, and tracking processes, improving overall efficiency.

VII. FUTURE ENHANCEMENTS

1.SMS OTP Integration: Enhance authentication by adding SMS-based OTP along with email verification.

2.Mobile Application Support: Develop a mobile app for easier visitor registration and QR scanning.

3.Cloud Deployment: Deploy the system on cloud platforms for better scalability and remote access.

4.Face Recognition Integration: Improve security by adding face recognition for visitor identification.

5.Advanced Analytics Dashboard: Include graphical reports and insights to analyze visitor patterns and trends.

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