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QR – ENABLED FOOD ORDERING SYSTEM

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Abstract: The rapid growth of digital systems has increased the need for quick, secure, and contactless access to information across various domains such as education, business, and service management. Traditional manual methods of information sharing and verification often lead to inefficiencies, delays, and data management challenges. To address these issues, this paper proposes a **QR Code-Based Information and Access System**, an intelligent digital platform designed to provide fast, secure, and efficient information retrieval using Quick Response (QR) code technology. The proposed system integrates QR code generation, real-time data access, web-based interfaces, and secure database management to deliver a reliable and user-friendly solution. QR codes act as a bridge between physical objects and digital information, enabling users to quickly scan codes using mobile devices to retrieve relevant data such as product details, digital documents, authentication records, or service information. The system ensures efficient data handling, reduces manual effort, and improves accessibility through instant scanning and automated data retrieval.

Additionally, the platform supports dynamic QR code generation, secure data storage, and seamless interaction between frontend and backend services. The web-based interface allows administrators to generate and manage QR codes, while users can easily access the encoded information through scanning. This approach enhances operational efficiency, reduces paperwork, and minimizes the chances of data errors.

System evaluation demonstrates that the QR Code-Based Information System improves speed, accessibility, accuracy, and overall user experience compared to traditional information management approaches. The proposed architecture provides a scalable and flexible solution suitable for applications in education, attendance systems, product tracking, digital verification, and service management.

Keywords: QR Code Technology, Information Access System, Secure Data Retrieval, Web-Based Platform, QR Code Generation, Digital Verification, Data Management, Real-Time Access, Information System.

I. INTRODUCTION

The rapid digital transformation of modern information systems has significantly improved the way data is accessed, shared, and managed across various sectors such as education, business, and service management. Digital platforms enable faster communication, efficient data handling, and improved accessibility to information. However, traditional methods of information distribution and verification still face several challenges, including manual processing, data redundancy, delayed access to information, and limited system efficiency. These conventional systems often rely on manual record keeping or static data sharing methods, which can result in errors, inefficiencies, and increased operational workload.

QR (Quick Response) code technology has emerged as an effective solution for bridging the gap between physical objects and digital information. QR codes are two-dimensional barcodes capable of storing various types of data such as text, URLs, identification details, and digital records. By scanning QR codes using mobile devices or scanners, users can instantly access encoded information without the need for manual input or complex navigation. This technology enables faster data retrieval, reduces human errors, and enhances the efficiency of information management systems.

In addition to QR code technology, advancements in web-based applications, cloud storage, and real-time communication technologies have further improved the capability of digital systems to provide seamless and secure access to information. Modern web technologies allow systems to dynamically generate QR codes, store associated data in secure databases, and provide instant access to information through user-friendly interfaces. These technologies support efficient data processing, real-time updates, and improved scalability for large-scale applications.

To address the limitations of traditional information systems, this paper proposes a **QR Code-Based Information and Access System**, a web-based platform designed to provide fast, secure, and efficient information retrieval through QR code scanning. The system enables administrators to generate and manage QR codes associated with specific digital records, while users can scan the codes to quickly access relevant information. By integrating QR code generation, secure

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database management, and real-time information access, the proposed system improves operational efficiency, minimizes manual intervention, and enhances overall user experience in digital information management.

II. LITERATURE SURVEY

2.1 QR Code–Based Information Systems

Recent advancements in QR (Quick Response) code technology have significantly improved the efficiency of digital information sharing and access systems. Traditional methods of storing and retrieving information often rely on manual data entry, printed documents, or static web links, which can be time-consuming and prone to errors. QR code–based systems overcome these challenges by enabling quick and contactless access to digital information through simple scanning using smartphones or dedicated scanners.

Several research studies have proposed QR code–enabled platforms for applications such as product information systems, digital document verification, and attendance management. These systems allow encoded data or URLs to be embedded within QR codes, enabling users to instantly retrieve information from centralized databases. Although these solutions improve accessibility and reduce manual effort, many of them mainly focus on static information retrieval and lack advanced features such as dynamic QR generation, secure data management, and real-time system integration.

2.2 QR Code–Based Authentication and Verification Systems

QR code technology has also been widely adopted for authentication and digital verification processes. Many modern systems use QR codes for login authentication, ticket verification, digital payments, and identity validation. By scanning a unique QR code, users can securely verify their identity or access authorized services without entering complex credentials manually.

Despite these advantages, several existing QR-based authentication systems operate within basic security frameworks and lack advanced encryption, secure backend integration, and centralized monitoring. In some cases, static QR codes can be copied or reused, leading to potential security vulnerabilities. Therefore, integrating QR code systems with secure backend architectures and dynamic QR generation mechanisms becomes essential to ensure reliability and prevent unauthorized access.

2.3 QR Code–Based Information Access and Tracking Systems

QR codes are widely used in systems that require quick access to stored digital information. Applications such as inventory management, product tracking, digital menus, academic resources, and service management utilize QR codes to simplify information retrieval. By scanning a QR code placed on a product, document, or location, users can instantly access detailed information stored in a database or web platform.However, many conventional QR code systems are designed for limited purposes and often lack real-time data synchronization, centralized management, and scalability. Additionally, these systems may not support dynamic updates or efficient administrative control, which restricts their applicability in large-scale digital environments.

2.4 Research Gap and Motivation

From the literature review, it is evident that existing QR code–based systems mainly focus on individual applications such as authentication, attendance tracking, or information access. Most of these systems operate independently and lack a unified platform that integrates QR code generation, secure data management, real-time access, and centralized administration.

These limitations highlight the need for a more integrated and scalable solution. Therefore, this research proposes a QR Code-Based Information and Access System, which combines QR code generation, secure database management, and web-based interfaces to deliver a reliable platform for efficient information retrieval and management.

2.5 Related Work

Several studies have explored the application of QR codes in digital systems to improve efficiency and accessibility. QR code–based systems are widely used for product tracking, attendance management, digital payments, and quick access to web resources. These systems allow users to retrieve information quickly through mobile scanning, reducing manual data entry and improving operational efficiency.Some research has focused on QR code authentication mechanisms to support secure login systems and identity verification. While these approaches improve convenience and user interaction, many of them rely on static QR codes or limited backend security mechanisms, which may affect reliability and system scalability.

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Other studies have explored QR codes in educational and service management systems, where users can scan codes to access documents, schedules, or service information. However, these implementations often lack advanced data management capabilities and centralized administrative control. These limitations motivate the development of an improved QR code–based platform that integrates secure data storage, dynamic QR generation, and efficient information access within a unified system.

Reference	Technology Used	Focus Area	Limitation	Proposed System Advantage
Singh et al.	QR Code Technology	QR Code Technology	QR Code Technology	QR Code Technology
Reference	**Technology Used**	**Focus Area**	**Limitation**	**Proposed System Advantage**
Singh et al.	QR Code Technology	Information Access System	Static QR codes	Supports dynamic QR generation
Lee et al.	Mobile QR Scanner	User Authentication	Limited security mechanism	Secure database-based verification
Zhang et al.	Web-based QR Platform	Product Information Retrieval	No centralized management	Integrated admin management system

Table 2.5.1 Related Work

III SYSTEM ARCHITECTURE

The system architecture of the QR Code-Based Information and Access System is designed using a modular framework to ensure efficient data management, secure information access, and fast system performance. The architecture integrates QR code generation, web-based services, and database management to create a reliable digital platform.
Administrators generate and manage QR codes linked to specific records stored in the database. Users can scan these QR codes using mobile devices to quickly access the associated information through the web interface. The backend server processes requests and retrieves the required data from the database in real time.

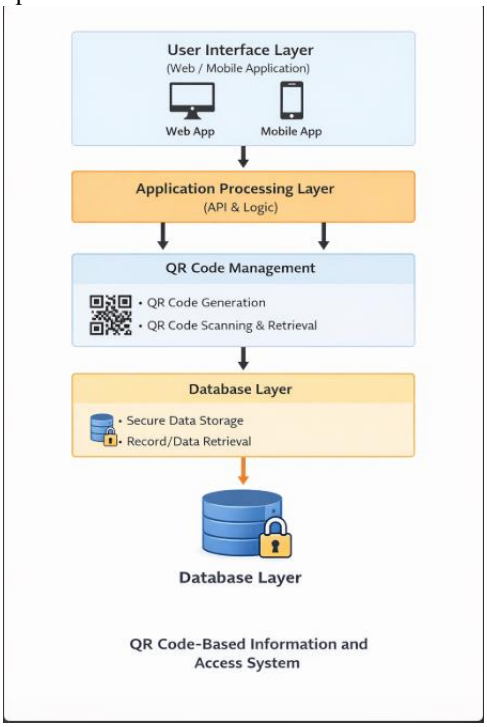

Fig 3.1 System Architecture

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3.2 Modules of the Proposed System

The proposed **QR Code-Based Information and Access System** is designed using a modular architecture to ensure efficient data management, secure access, and reliable system performance. Each module performs a specific function and interacts with other components to provide a smooth and integrated system operation. The major modules of the proposed system include the **User Module, Admin Module, QR Code Generation Module, QR Code Scanning Module, Data Management Module, and Authentication Module**.

Module	Technologies Used	Description
Module	**Technologies Used**	**Description**
User Module	React, Web Interface, APIs	Allows users to access the system, scan QR codes using mobile devices, and retrieve stored information quickly.
Admin Module	Web Dashboard, Backend APIs	Enables administrators to manage system data, generate QR codes, update records, and monitor system activities.
QR Code Generation Module	QR Code Libraries, APIs	Generates unique QR codes linked to specific data or digital records stored in the database.
QR Code Scanning Module	Mobile Camera, QR Scanner API	Allows users to scan QR codes and retrieve the corresponding information instantly.
Authentication Module	Login System, Security APIs	Provides secure user authentication and access control for system users and administrators.
Data Management Module	Database (MongoDB / MySQL)	Stores and manages system data such as user information, QR code records, and related details securely.
Backend Processing Module	Node.js / Express.js	Handles business logic, API requests, data processing, and communication between frontend and database.
Information Retrieval Module	Web APIs	Retrieves and displays the data linked to QR codes in real time after scanning.

Table 3.2.1 Module

3.3 Key Features

The proposed **QR Code-Based Information and Access System** introduces several features designed to improve information retrieval, data management, and system efficiency. By integrating QR code technology, web-based applications, and secure database management, the system provides fast, reliable, and user-friendly access to digital information.

Feature	Technology Used	Description
QR Code Generation	QR Code Libraries	Generates unique QR codes linked to specific digital records
QR Code Scanning	Mobile Camera, QR Scanner	Allows users to scan QR codes and access information instantly
Secure Data Storage	Database Systems	Ensures safe storage and management of digital records
Web-Based Interface	React / Web Technologies	Provides an interactive platform for users and administrators
Dynamic QR Management	Backend APIs	Enables administrators to create and manage QR codes
User Authentication	Authentication Services	Provides secure login and access control
Real-Time Data Retrieval	Web APIs	Retrieves information instantly after QR scanning
Centralized Data Management	Database Server	Maintains organized storage of system data

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Scalable Architecture	Modular Design	Supports system expansion and large-scale usage
Efficient Information Access	QR Technology	Reduces manual effort and improves access speed

Table 3.3.1 Key Features

3.4 Workflow

The workflow of the **QR Code-Based Information and Access System** describes the step-by-step operational process from QR code generation to information retrieval by users. The system integrates QR code generation, secure data storage, web-based access, and QR scanning to ensure quick and efficient information delivery.
Initially, the administrator logs into the system and generates QR codes linked to specific records stored in the database. These QR codes are then shared or displayed for users to scan. When a user scans the QR code using a mobile device or QR scanner, the system sends a request to the backend server. The server processes the request and retrieves the corresponding information from the database. The requested information is then displayed to the user through the web interface in real time. This workflow ensures fast data access, reduced manual effort, and efficient information management.

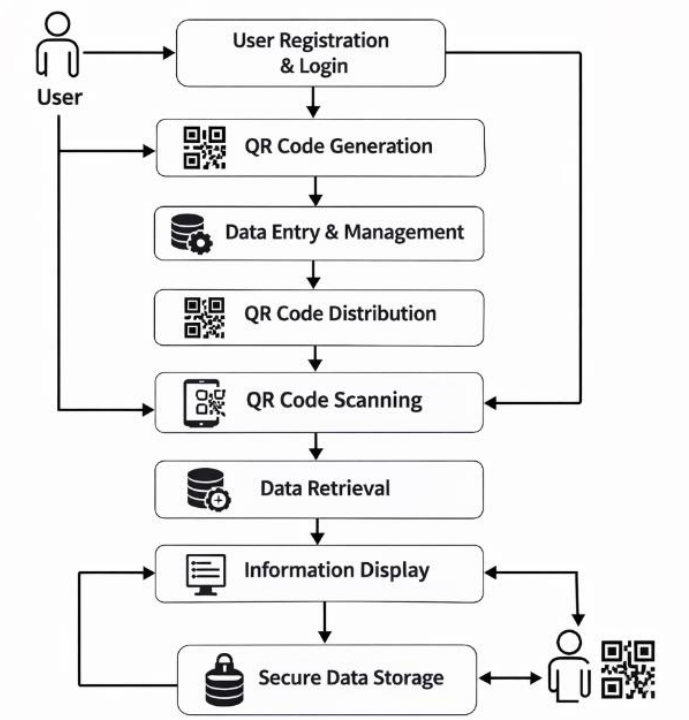

Fig 3.4.1 Workflow

Process Stage	Description
User Registration	User creates an account in the system.
Authentication	Secure login verification for accessing the system.
QR Code Generation	Administrator generates QR codes linked to specific records.
Data Entry	Information related to the QR code is stored in the database.
QR Code Distribution	Generated QR codes are shared or displayed for users.
QR Code	User scans the QR code using a mobile device or scanner.
Request Processing	System sends the scanned request to the backend server.

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Data Retrieval	The server retrieves the related information from the database.
Information Display	Retrieved information is displayed to the user in real time.
Data Storage	System securely stores and manages all records in the database.
User Registration	User creates an account in the system.
Authentication	Secure login verification for accessing the system.

Table 3.4.2 Workflow Stages

IV. DATA FLOW DIAGRAM

The **Data Flow Diagram (DFD)** represents the logical flow of information within the **QR Code-Based Information and Access System**. It illustrates how data is created, processed, stored, and retrieved within the system. The DFD helps in understanding how information moves between users, system modules, and the database, ensuring efficient and organized data management.

The system accepts inputs such as user registration details, QR code generation requests, and data records from the administrator. These inputs are processed through the application modules, where QR codes are generated and linked with stored information in the database. When users scan the QR codes using mobile devices, the system processes the request and retrieves the corresponding data from the database. The retrieved information is then displayed to the user through the web interface, ensuring fast and accurate information access.

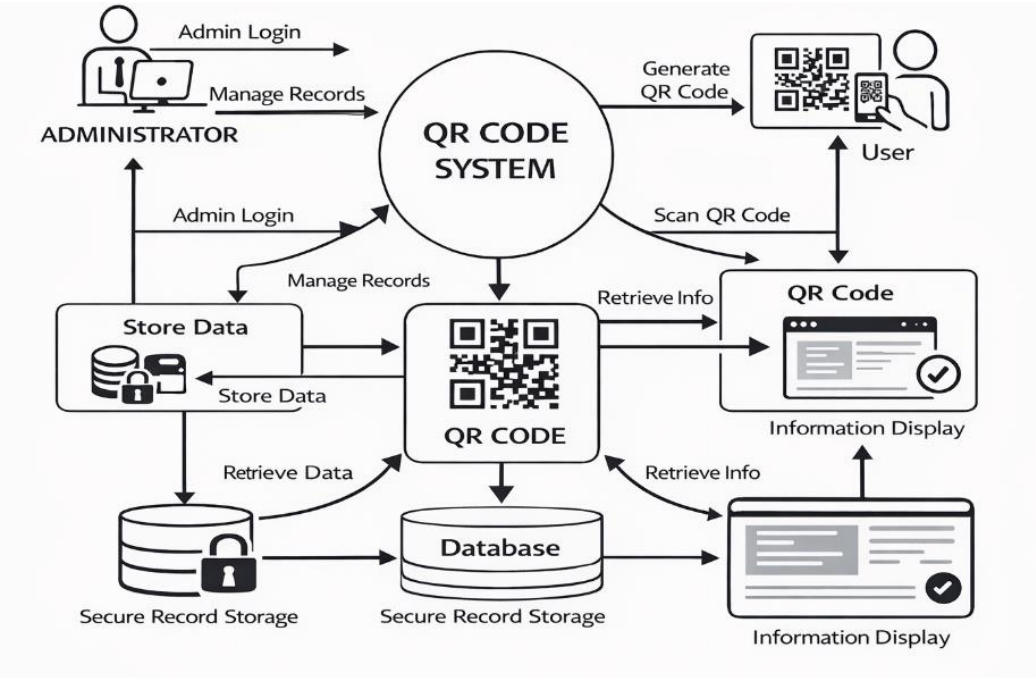

Fig 4.1 Data Flow Diagram

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Process Name	Description
User Authentication	Verifies user identity for secure system access
QR Code Generation	Creates unique QR codes linked to specific data
Data Entry & Storage	Stores information related to QR codes in the database
QR Code Scanning	Allows users to scan QR codes using mobile devices
Request Processing	System processes the scanned QR code request
Data Retrieval	Retrieves corresponding information from the database

Table 4.1.1 Data Flow

V. METHODOLOGY

The **QR Code-Based Information and Access System** follows a structured methodology integrating QR code generation, web-based applications, and secure database management to ensure efficient data access and information retrieval.

Step 1: User Registration & Authentication
Users and administrators register and securely log into the system to access its features.
Step 2: Data Entry & Management
Administrators enter and manage information that will be linked to QR codes and stored in the database.
Step 3: QR Code Generation
The system generates unique QR codes connected to specific records stored in the database.
Step 4: QR Code Scanning
Users scan the QR codes using mobile devices or QR scanner applications to access information.
Step 5: Information Retrieval & Display
The system retrieves the corresponding data from the database and displays it to the user through the web interface.

Module	Technology	Function
User Module	React + API	User registration and login
Admin Module	Web Interface + Backend APIs	Admin Module
QR Code Module	QR Code Libraries	QR Code Module
Scanning Module	Mobile Camera / QR Scanner API	Scanning Module
Database Module	MySQL / MongoDB	Database Module

Table 5.1 Module Description

VI. IMPLEMENTATION

The implementation of the QR Code-Based Information and Access System focuses on developing a secure, efficient, and scalable platform by integrating QR code technology, web-based applications, and database management systems. The system is built using a modular architecture that allows each module to function independently while ensuring smooth interaction between components.

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The system enables administrators to generate QR codes linked to specific records stored in the database. When users scan the QR codes using mobile devices, the system processes the request and retrieves the associated information from the database in real time. The frontend interface is developed using modern web technologies to provide a responsive and user-friendly experience, while backend services manage application logic, data processing, and communication with the database.

Secure database systems are used to store and manage records, ensuring reliable data access and management. This implementation improves information accessibility, reduces manual processes, and enables fast and efficient retrieval of data through QR code scanning.

Module	Technology Used	Purpose
Frontend	React.js / HTML / CSS	User interaction and information display
Backend	Node.js / Express.js	API services and application logic
QR Code Module	QR Code Libraries / APIs	Generate and manage QR codes
Scanner Module	Mobile Camera / QR Scanner API	Scan QR codes and retrieve data
Database	MongoDB / MySQL	Store system records and QR data
Storage	Secure Cloud / Database	Store and manage digital information
Web Interface	Web Technologies	Provide access to users and adminstrators
Authentication Module	Login System / Security APIs	User login and access control
Data Retrieval Module	REST APIs	Fetch and display information after scanning

Table 6.1 Implementation

VII. BENEFITS AND CHALLENGES

7.1 Benefits

The proposed **QR Code-Based Information and Access System** improves information accessibility and management by integrating QR code technology with web-based applications and secure database systems. QR codes enable quick and contactless access to digital information, reducing manual effort and improving system efficiency. The system allows users to instantly retrieve stored information through scanning, while administrators can easily generate and manage QR codes linked to specific records. This approach enhances operational efficiency, reduces errors in data handling, and provides a faster and more reliable method of accessing information.

Benefit	Description
Fast Information Access	QR codes allow users to quickly access information by scanning.
Reduced Manual Work	Eliminates the need for manual data entry and searching.
Efficient Data Management	Centralized database helps organize and manage information effectively.
Improved Accuracy	Reduces human errors in data retrieval and handling.
Easy QR Code Generation	Administrators can easily generate and manage QR codes.

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Quick Information Retrieval	Users can instantly retrieve data through QR scanning.
System Reliability	Web-based architecture ensures consistent system performance.
Scalability	The modular system design supports future expansion.
Automation	QR codes automate the process of accessing stored information.
Better User Experience	Better User Experience Provides a simple and user-friendly method to access digital information.

Table 7.1.1 Benefits of the Proposed System

7.2 Challenges

Despite its advantages, the proposed **QR Code-Based Information and Access System** faces certain challenges related to system implementation, data management, security, and technological requirements.

Challenge	Description
Implementation Cost	Initial system setup and development may require technical resources
System Complexity	Designing and maintaining the web-based system requires skilled development
Security Risks	Unauthorized access or misuse of QR codes may occur if not properly secured
Data Management Issues	Large amounts of stored data require proper database management
Integration Challenges	Integrating the system with existing platforms may be difficult
Network Dependency	QR code scanning and data retrieval require internet connectivity
User Awareness	Users must understand how to scan and use QR codes
Device Compatibility	Different devices and scanners may affect system performance

Table 7.2.1 Challenges of the Proposed System

VIII. DISCUSSION AND FUTURE WORK

Discussion:

The proposed **QR Code-Based Information and Access System** effectively utilizes QR code technology and web-based applications to improve information accessibility and data management. By linking QR codes with digital records stored in a centralized database, the system enables users to quickly retrieve information through simple scanning using mobile devices. This approach reduces manual data entry, improves efficiency, and simplifies the process of accessing stored information.

The system also enhances operational efficiency by allowing administrators to easily generate and manage QR codes linked to specific records. The integration of web technologies ensures fast data retrieval and a user-friendly interface, making the system accessible and easy to use. Additionally, the modular architecture supports scalability and allows the system to be extended for various applications such as product tracking, digital verification, attendance management, and information access systems.

However, certain challenges remain, including ensuring QR code security, managing large volumes of stored data, and maintaining reliable internet connectivity for real-time information retrieval. Despite these limitations, the proposed system significantly improves information management efficiency and provides a practical solution for modern digital access systems.

Future Work:

Future enhancements of the **QR Code-Based Information and Access System** aim to improve system functionality, security, and scalability. Advanced security mechanisms such as encrypted QR codes and secure authentication methods can be implemented to prevent unauthorized access and improve data protection.

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The system can also be expanded to support mobile applications, allowing users to scan QR codes and access information directly through dedicated mobile platforms. Integration with cloud storage systems can further improve data availability and scalability. Additionally, incorporating real-time analytics and monitoring features can help administrators track system usage and manage information more effectively. These future improvements will enhance the system's performance and expand its applicability across different industries and digital services.

IX. CONCLUSION

The **QR Code-Based Information and Access System** integrates QR code technology with web-based applications and secure database management to enable fast and efficient information retrieval. The proposed system improves data accessibility, reduces manual effort, and simplifies the process of accessing digital information through QR code scanning. By linking QR codes with stored records, users can instantly retrieve relevant information using mobile devices. The system enhances operational efficiency, reliability, and scalability, making it a practical solution for modern digital information access and management systems.

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