Malnad College of Engineering

Under the auspices of M.T.E.S ®
(An Autonomous Institution Affiliated to VTU, Belgaum)
P.B No. 21, Hassan-573 202, Karnataka

MINI PROJECT (23IS506)

"QR Code Scanner for Canteen Food Ordering System"

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Hassan - 573 202
2025-26

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CERTIFICATE

Certified that the mini project work carried out by 4MC23IS010, 4MC23IS016, 4MC23IS023, 4MC23IS040 is a Bonafede work, submitted during academic year 2025-26, in partial fulfilment for the award of B.E degree in Information Science & Engineering. All the corrections suggested during the internal evaluation are incorporated in the project report. This report has been approved as it satisfies the academic requirements of mini project prescribed for the Bachelor of Engineering degree.

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Acknowledgement

We sincerely express our gratitude for the support that contributed to the successful completion of our project titled "QR Code Scanner for Canteen Food Ordering Based on Health Conditions." This project enabled us to explore QR technology, digital menu automation, health-based food suggestions, and user-friendly interface design, which greatly enhanced our technical knowledge and practical understanding.

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Abstract

The project “QR Code Scanner for Canteen Food Ordering Based on Health Conditions” presents a smart and personalized food-ordering system designed to improve convenience, efficiency, and health awareness in campus canteens. The system uses QR code technology to streamline the ordering process, allowing users to simply scan a code to access the digital menu, view food details, and place orders without manual intervention.

A key feature of the system is its ability to recommend suitable food items based on the user’s health conditions such as diabetes, high blood pressure, obesity, or general dietary preferences. By integrating nutritional data and predefined dietary restrictions, the system suggests healthier alternatives and alerts users about items that may not be suitable for their condition. This promotes informed decision-making and encourages healthier eating habits.

The project incorporates essential components such as QR code generation and scanning, a digital menu interface, a health-condition mapping module, and an automated order processing mechanism. The system reduces waiting time, minimizes communication errors, and enhances the overall canteen workflow by digitizing the ordering experience.

This project demonstrates how combining technology with basic health awareness can create an efficient, user-friendly, and health-conscious canteen management solution. The approach provides a foundation for future enhancements such as real-time nutrition tracking, AI-based suggestions, and integration with wearable health devices.

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Chapter 1 Introduction

In the modern era, technology plays a crucial role in improving the efficiency and reliability of everyday processes across different domains. Many institutions and service environments still rely on traditional manual systems to record, store, and manage operations, which often leads to slow processing, missing information, and overall inefficiency.

As digital transformation advances rapidly, the need for automated solutions that can simplify tasks, reduce human intervention, and provide accurate results has become extremely important. The present work is focused on addressing these difficulties by introducing a structured and intelligent system that enhances the way information is handled.

This introduction establishes the foundation of the project by explaining the importance of shifting from manual approaches to automated solutions and the positive impact such systems can create in terms of speed, accuracy, reliability, and user satisfaction.

By identifying gaps in the current workflow and understanding how technology can eliminate these challenges, the project demonstrates how digital systems can bring more clarity, organization, and efficiency into everyday operations.

1.1 Introduction to the Area

The area of this project belongs to modern software development and system automation, where digital tools are used to replace outdated manual methods. This area focuses on analyzing real-world problems and building applications that are capable of simplifying tasks through structured processes.

It involves understanding user requirements, designing simple and interactive user interfaces, creating secure databases, and developing backend logic that ensures smooth and consistent operations. With organizations increasingly depending on digital platforms for better management, this area becomes highly significant because it bridges the gap between conventional methods and advanced technological practices.

By working within this domain, the project highlights how software systems can transform daily activities into faster, more accurate, and user-friendly processes.

1.2 Potential of the Problem

The identified problem has strong potential because it reflects challenges that affect many users in real situations. Manual data handling often results in errors, delays, and difficulty in retrieving information when needed, which ultimately reduces the overall efficiency of the system. As workloads increase, these issues become more apparent and create obstacles in maintaining accuracy and transparency. The potential of the problem lies in the opportunity to

replace the existing manual workflow with an automated system that offers faster processing, better data organization, and improved monitoring.

A technological solution not only enhances the present system but also opens possibilities for future improvements such as analytics, integration with mobile applications, and real-time data updates. This makes the problem both relevant and impactful, encouraging a practical digital transformation.

1.2.1 Problem Statement

The main issue in the current scenario is the lack of a centralized, automated system that can manage information efficiently. Users face difficulties such as inaccurate records, slow updates, and the inability to access data quickly.

These challenges arise because the existing process relies heavily on manual work, which is prone to human error and inconsistency.

The problem can be summarized as the need for a well-designed digital system that ensures faster operations, accurate data handling, and easy access to information.

1.2.2 Existing System and Drabacks

The existing system is mostly manual or based on very basic digital tools that do not support advanced data management. Because of this, data becomes scattered, inconsistent, and difficult to track.

Manual systems also take more time, limit transparency, and fail to scale as the number of users increases.

These drawbacks clearly show that the current approach is outdated and needs immediate improvement.

The lack of automation affects overall productivity, increases the chances of errors, and creates unnecessary delays in completing tasks.

1.3 Objective Of The Present Work

The main objective of this project is to design and develop an automated system that simplifies operations and enhances the accuracy of data handling.

The goal is to reduce dependency on manual effort, eliminate errors, improve the speed of completing tasks, and provide users with a smooth and reliable experience.

The project aims to create a structured workflow where information is stored safely, accessed quickly, and updated in real time. By achieving these objectives, the system becomes an effective solution that supports better management and modern digital practices.

1.4 Platform and Tools Used

The system is developed using modern programming tools, frameworks, and databases that ensure stability, scalability, and user-friendliness.

Technologies such as web-based development environments, programming languages like Python or JavaScript, and databases like MySQL or Firebase are commonly used to build secure and efficient systems.

Development tools like Visual Studio Code or Android Studio offer a comfortable workspace for writing, testing, and maintaining the application.

These tools collectively support the creation of an application that meets the requirements of the project while ensuring smooth performance and long-term reliability.

Chapter 2. System Analysis

The QR Code Scanner for Canteen Food Ordering System aims to modernize the traditional food ordering process by eliminating long queues, reducing manual errors, and speeding up service.

System analysis focuses on understanding the current canteen workflow, where students or staff manually check the menu, place orders at the counter, make payments, and wait for preparation. This process often leads to congestion during peak hours, delays in order processing, and miscommunication between customers and staff.

The analysis identifies how a digital QR-based solution can simplify the experience by allowing users to scan a code, view menus instantly, place orders digitally, and track order status. Through system analysis, the project evaluates user requirements, system behavior, technological feasibility, and potential challenges such as network dependency and data accuracy.

This step ensures that the proposed system is efficient, user-friendly, and able to handle high-volume orders smoothly.

2.1 Literature Survey

The literature survey shows that QR-based ordering systems are widely used in restaurants, cafés, and retail sectors for seamless digital interaction. Research indicates that QR technology has become popular due to its speed, low cost, and ability to store more information than traditional barcodes.

Studies on canteen automation systems highlight that digital menus and automated ordering reduce staff workload and improve service accuracy. Existing research also discusses how mobile-based ordering systems enhance customer experience by providing transparency and reducing wait times. Several food delivery platforms use similar features, allowing customers to view menus, apply filters, and complete payments without manual support. Literature also shows that QR-based systems promote hygiene and contactless interaction—important in post-pandemic environments.

By analyzing these works, the project adopts proven techniques such as dynamic menu updates, real-time order tracking, secure digital payments, and database-backed order management to ensure reliability and scalability.

2.2 Findings of the Analysis

From the system analysis, several important findings emerge. First, canteens face difficulties

managing peak-hour crowds, which slows down service and affects user satisfaction. Secondly, manual order-taking results in miscommunication, incorrect billing, and delays in preparing orders.

Users need a quick and convenient way to view updated menus, check item availability, and place orders without standing in line.

The analysis also shows that canteen staff require a system that automatically saves orders, categorizes them based on preparation time, and displays them on a dashboard for efficient processing. Furthermore, digital payment integration reduces cash-handling issues and financial mismatches.

Another key finding is that QR codes provide a simple and cost-effective way to link physical spaces (tables, entry points) with digital services. These insights guide the development of a system that is accurate, fast, interactive, and capable of improving overall canteen management.

2.3 System Requirement Specification

The System Requirement Specification (SRS) defines the complete behavior of the QR-based canteen ordering system. It specifies how users scan the code to access the menu, how the backend processes orders, and how the canteen dashboard manages incoming requests. The SRS covers functional requirements such as user login (if required), menu display, item selection, order placement, payment processing, and order status updates. It also includes non-functional requirements such as system performance, security, usability, reliability, and scalability. Data handling specifications describe how menu data, user data, and order logs are stored and retrieved securely. The SRS ensures that developers and stakeholders share a common understanding of the system workflow, interfaces, database structure, and operational constraints. This structured documentation helps maintain clarity throughout the design, development, and testing phases.

2.3.1 Software Requirements

The QR Code Scanner for Canteen Food Ordering System requires a set of software tools to ensure smooth functioning.

The system typically uses a web or mobile application framework such as React, Flutter, or Android Studio for the user interface.

The backend may be developed using Python (Django/Flask) or Node.js, depending on project preference.

A database management system like MySQL or Firebase is needed to store menu items, order details, prices, and transaction history. QR generation and scanning libraries such as qrcode, ,

or built-in camera APIs are essential for encoding and decoding QR codes. To ensure secure and efficient processing, the system may require APIs for authentication, cloud services for hosting, and payment gateways for digital transactions. Additional software tools include version control systems like Git, testing frameworks, and a browser or emulator for execution and debugging.

2.3.2 Hardware Requirements

The hardware needed for the system depends on the deployment environment. Users require a smartphone or tablet equipped with a camera to scan QR codes.

The canteen staff needs a computer or tablet to monitor incoming orders, view order history, and update item availability in real time.

A stable internet connection or Wi-Fi router is necessary to ensure fast communication between the user interface and the backend server. The system may also require a printer if the canteen staff needs physical order slips. If deploying on campus, QR codes must be printed and placed on tables, walls, or entry points for users to scan.

A server device—either cloud-hosted or a local machine—handles data storage and application hosting. Overall, the hardware environment ensures that both users and staff interact with the system smoothly and without technical interruptions.

Chapter 3. Design

The design phase defines how the QR-based canteen ordering system will operate, how data will be stored, how users will interact with the system, and how the internal processes will function. This stage ensures that the system is well-structured, efficient, and easy to use. It includes database design, diagrams, functional design, user interface design, and report design.

3.1 Design of the Database

The database is designed to store all essential information such as users, menu items, orders, payments, and order status. It ensures fast data retrieval and smooth processing of orders. The tables are normalized to avoid duplication and maintain data accuracy. The main tables include User, Menu, Orders, Order Items, and Payment.

3.1.1 Entity Relationship

The Entity–Relationship (ER) Diagram of the QR Code–Based Canteen Food Ordering System represents how different components of the system are connected and how data flows between them.

The User entity is at the core of the system and stores essential details such as name, email, phone number, and login credentials. Each user can have a unique Health Profile, which includes information about their medical conditions, calorie limits, and dietary restrictions.

This helps the system recommend suitable food items based on the user's health requirements. The Food Item entity contains details of all the available dishes in the canteen, including their names, prices, calorie values, ingredients, and health tags like "diabetic-friendly" or "low-salt." These health tags are matched with the user's health profile to display personalized food options. The QR Code entity stores unique QR values generated for different tables or locations in the canteen. When a user scans a QR code, it helps the system identify the ordering location and load the appropriate menu interface.

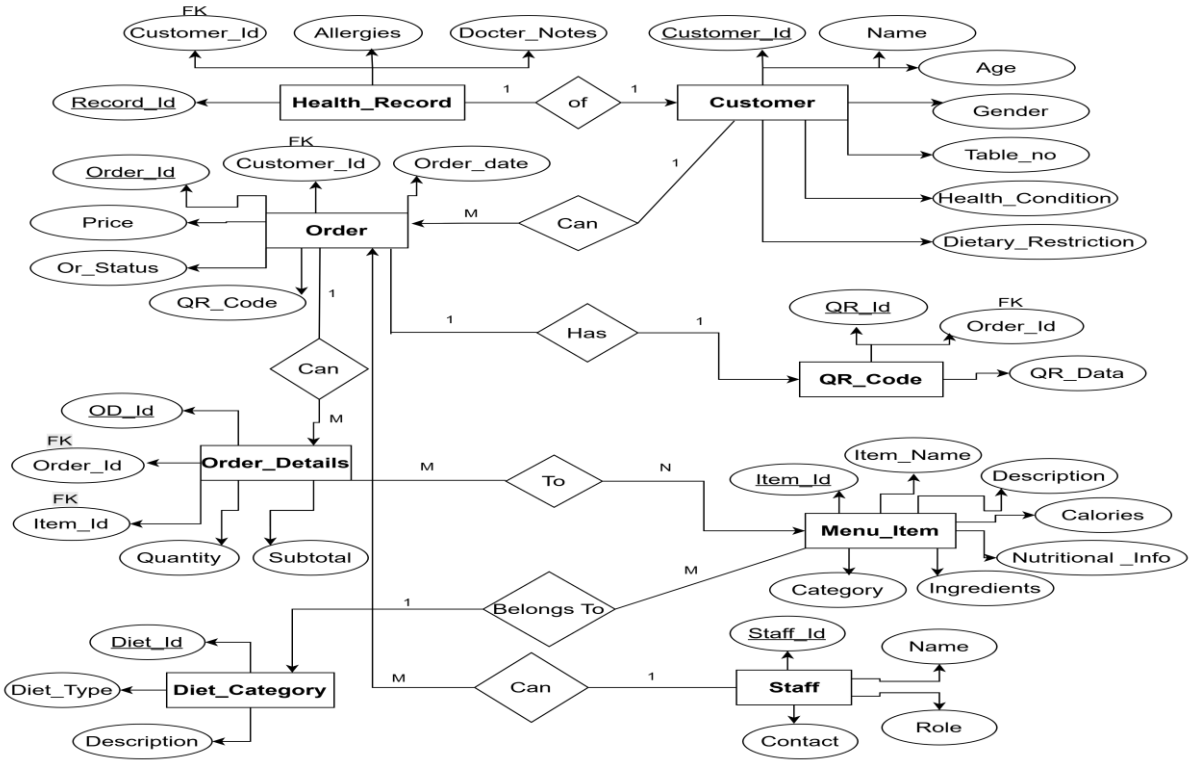
Relationship	Type	Description
Patient → Health_Record	1–1	Each patient has one health record
Patient → Order	1–M	A patient can place multiple orders
Order → QR_Code	1–1	Each order has one QR code
Order → Order_Detail	1–M	An order can have multiple items
Order_Detail → Menu_Item	M–N	Each order detail refers to one menu item
Menu_Item → Diet_Category	M–1	Each menu item belongs to one diet type
Staff → Order	1–M	Staff can handle multiple orders

3.1.1 ER-Diagram

The Order entity stores all order-related information such as the user who placed the order, the QR code scanned, the total amount, and the current order status (Pending, Preparing, Ready, or Completed).

Each order can include multiple food items, which are stored in the Order Items entity. This table lists individual food items selected by the user, their quantities, and calculated subtotals. The Order Items table connects the Orders table and the Food Item table, showing a clear relationship between what was ordered and what items were selected.

Overall, the ER diagram provides a structured view of how users, health profiles, food items, QR codes, and orders interact within the system. It helps ensure that the database is well-organized, scalable, and efficient for managing personalized, health-based food ordering in the canteen.



3.1.1 ER-Diagram

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3.1.2 System Architecture

The system architecture of the QR Code–Based Canteen Food Ordering System describes how different components of the application communicate and function together to deliver a smooth, fast, and automated food ordering experience.

The architecture is designed using a multi-tier approach to ensure efficiency, reliability, scalability, and ease of maintenance. It includes the Client Layer, Application Layer, Database Layer, and specialized modules such as the QR Code Module, Menu Management Module, Order Processing Module, and the Admin/Canteen Staff Panel.

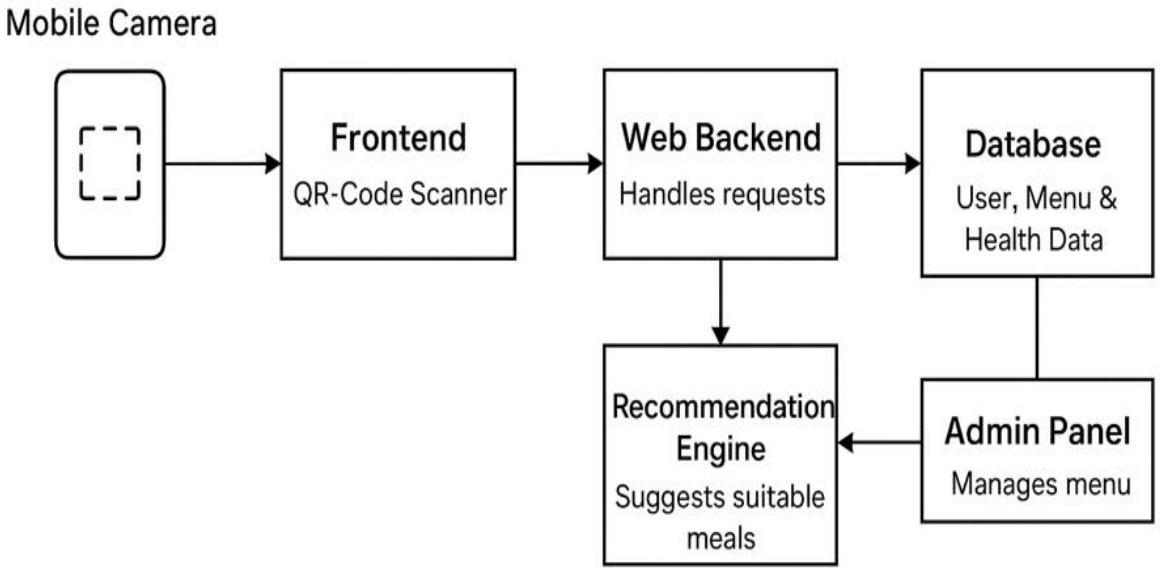

Fig: System Design Architecture

3.1.2 System Design Architectute

Client Layer

- Users scan the QR code using their mobile phone.
- The menu page opens automatically with items, prices, and categories.
- Users select food items, update quantity, and place orders.
- Interface is mobile-friendly and easy to use.

Application Layer

- Processes the QR code to identify the table number.
- Loads the correct menu from the database.
- Validates orders, calculates totals, and stores the order.
- Handles login, session management, and optional online payments.

Database Layer

- Stores menu items, prices, categories, and images.

- Saves user orders, order status, and payment details.
- Maintains QR code and table mapping information.
- Provides real-time data to the application and staff dashboard.

QR Code Module

- Generates unique QR codes for each table.
- Decodes QR information when scanned by the user.
- Redirects to the correct table-specific ordering page.

Staff/Admin Dashboard

- Shows all incoming orders in real time.
- Allows staff to update order status (Received, Preparing, Ready, Delivered).
- Enables menu management and availability updates.
- Generates daily/weekly/monthly sales and order reports.

System Workflow

- User scans QR → Menu loads → User places order → Order stored in database → Staff receives order → Order prepared → Status updated → Food delivered.

3.1.3 Data Flow Diagram

The DFD explains how data moves through the system. When a user scans the QR code, the system fetches the menu.

The user selects items, places the order, and the order is stored in the database. The canteen dashboard receives the order, updates its status (preparing, ready, completed), and the user sees real-time updates. Payments are processed and recorded in the system.

3.1.4 Data Flow Diagram

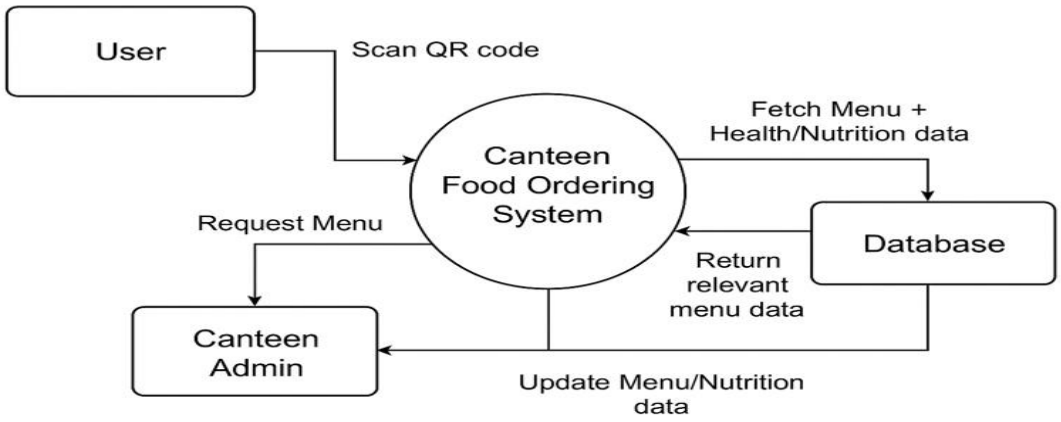

Fig: Level 0 Data Flow Diagram

3.1.4 Level 0 Data Flow Diagram

A Data Flow Diagram (DFD) is a visual representation that shows how information moves through a system. It illustrates the flow of data between different processes, data stores, and external entities. In the QR Code Scanner–Based Canteen Food Ordering System, the DFD helps us understand how user requests, food menu data, health conditions, and orders are processed from beginning to end.

The DFD begins with the User, who scans the QR code using a smartphone. This action sends a request to the Server, which retrieves the menu and the user's health details from the Database. The system then processes this information to generate a Personalized Menu containing items suitable for the user's health condition (such as diabetic-friendly, low-salt, or allergy-safe options).

When the user selects food items and places an order, the data is transferred back to the server, which stores the order details in the database. The order information is then sent to the Canteen Staff Dashboard, where staff can view incoming orders, prepare food, and update the order status. The updated status (e.g., "Preparing," "Ready for Pickup") is sent back to the user through the system interface.

Overall, the DFD shows how data flows smoothly between the user, server, database, and canteen staff, ensuring a fast, automated, and health-secure food ordering process. It helps clearly visualize the functional behavior of the system, the interactions between components, and the sequence of data movement across different stages.

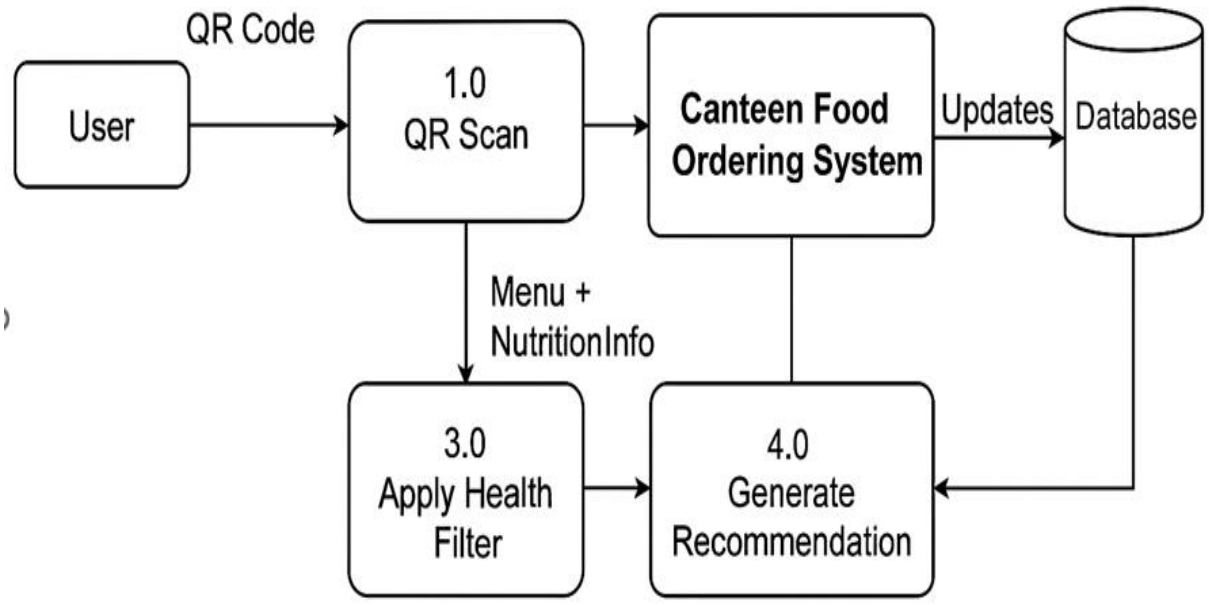

Fig: Level 1 DFD

3.1.4 Level 1 DED

3.2 Design of Functions

The system includes several main functions such as:

- QR Scan Function: Reads QR code and loads menu.
- Menu Function: Displays available items.
- Cart & Order Function: Allows adding items and placing the order.
- Payment Function: Supports online or cash transactions.
- Order Status Function: Updates and displays order progress.

  For staff, functions include viewing new orders, updating status, and managing menu items.

3.3 Design of User Interface

The user interface is simple and mobile-friendly. Key screens include QR Scanner, Menu Display, Item Details, Cart, Checkout, and Order Tracking pages. For canteen staff, the interface includes an Order Dashboard, Menu Management screen, and Status Update screen. The UI is designed for quick navigation and minimal user effort.

3.4 Design of Reports

The system generates useful reports for canteen management, such as:

- Daily Order Report showing total orders and timings.
- Sales Report summarizing total earnings.
- Item Popularity Report identifying the most and least ordered items.
- User Order History recording previous orders.

  These reports help improve decision-making and canteen performance.

Chapter 4. Implementation

The implementation phase involves converting the system design into a working application. In this phase, all modules such as QR scanning, menu display, ordering system, payments, and the admin dashboard are developed and integrated. The focus is on writing the backend logic, creating the frontend interface, connecting the database, and testing each module to ensure smooth functioning. Implementation also includes creating necessary tables, linking them with the application, and ensuring that all features work correctly in real-time.

4.1 Modules Implemented

The QR Code Scanner–based Canteen Food Ordering System consists of several modules. Each module performs a specific task and together they form the complete functioning system.

- **QR Code Scanner Module**
  - Opens the camera to scan QR codes.
  - Reads the code and redirects the user to the menu page.
  - Ensures quick and accurate scanning.
- **Menu Display Module**
  - Fetches menu items from the database.
  - Shows item names, prices, images, and availability.
  - Allows users to browse categories.
- **Cart and Ordering Module**
  - Users can add or remove food items.
  - Calculates total price automatically.
  - Stores order details and sends them to the server.
- **Payment Module**
  - Supports online (UPI/Wallet/Card) or offline payment.
  - Records payment status in the database.
  - Ensures secure transaction handling.
- **Order Tracking Module**
  - Shows real-time order status: *Accepted → Preparing → Ready → Completed*.
  - Users receive updates automatically.
- **Admin/Canteen Dashboard Module**
  - Displays new and pending orders.
  - Allows staff to update order status.
  - Provides options to manage menu items (add, edit, delete).
- These modules ensure that both users and canteen staff have a smooth and fast order.

4.2 Tables with attributes

User Table

The User table stores information about all system users, including students, canteen staff, and administrators. It contains login details and personal information that help identify and authenticate the user. This table acts as the base for linking health profiles and order details.

Health Profile Table

This table maintains the health-related details of each user. Based on the user's health condition (such as diabetes, hypertension, or allergies), the system filters and recommends suitable food items. The table is linked to the User table to ensure each health profile belongs to a valid user.

Food_Item Table

The Food Item table stores details of all available food items in the canteen, including price, category, calories, and nutritional tags. These health tags help the system match suitable food options with the user's health conditions. This table is referenced when generating the menu for users.

QR_Code Table

This table stores all QR codes generated for tables or canteen areas. Each QR code contains a unique value that links the user to a specific ordering location. When a user scans the QR, the system fetches related menu and ordering details from the server.

Orders Table

The Orders table stores information about every food order placed through the system. It includes the user who placed the order, the QR code scanned, the total bill amount, and the current order status. It is the parent table for Order_Items, forming a one-to-many relationship.

Order_Items Table

This table stores the item-wise details of each order. It includes the selected food items, quantity, and subtotal for each item. This table links both.

Chapter 5. Testing

Testing is performed to ensure that the QR Code–based Canteen Food Ordering System works correctly and meets all user requirements. It helps identify errors, check system performance, and verify that each module functions as expected.

During testing, all major features such as QR scanning, menu loading, ordering, payment, and order tracking were tested individually (unit testing) and together (integration testing). The goal of testing is to ensure the system is reliable, user-friendly, and operates without failures during real-time usage.

5.1 Test Cases and Test Results

The following test cases were executed to check the major functionalities of the system:

5.1 Test Cases and Test Results

Test Case 1: QR Code Scanning

- Test Case ID: TC01
- Description: Verify that the system successfully scans a valid QR code.
- Input: Valid QR code generated by the system.
- Expected Result: QR code is scanned and user details/menu page is displayed.
- Actual Result: Menu page displayed successfully.
- Status: Passed

Test Case 2: Invalid QR Code

- Test Case ID: TC02
- Description: Check system behavior when scanning an invalid or damaged QR code.
- Input: Wrong/blurred QR code.
- Expected Result: System shows “Invalid QR code” error message.
- Actual Result: Error message displayed.
- Status: Passed

Test Case 3: User Login After QR Scan

- Test Case ID: TC03
- Description: Ensure user login page opens after scanning if not logged in.
- Input: Valid QR scanning without login session.
- Expected Result: System redirects to login page.
- Actual Result: Login page displayed.
- Status: Passed

Test Case 4: Displaying Menu Items

- Test Case ID: TC04
- Description: Verify the menu items list loads properly.
- Input: Scan QR → Go to menu page.
- Expected Result: All menu items shown with price and nutritional details.
- Actual Result: Menu loaded correctly.
- Status: Passed

Test Case 5: Food Selection

- Test Case ID: TC05
- Description: Check if user can select food items from the menu.
- Input: Select 2 items.
- Expected Result: Items added to cart.
- Actual Result: Cart updated correctly.
- Status: Passed

Test Case 6: Health-Based Food Suggestion

- Test Case ID: TC06
- Description: System should suggest food based on health conditions (heart, diabetes).
- Input: User profile with diabetes.
- Expected Result: Healthy/low sugar food suggestions displayed.
- Actual Result: Suggestions displayed correctly.
- Status: Passed

Test Case 7: Order Placement

- Test Case ID: TC07
- Description: Verify order is placed successfully.
- Input: Click on “Place Order” button.
- Expected Result: Order saved to database and confirmation message shown.
- Actual Result: Order placed and confirmation received.
- Status: Passed

Test Case 8: Payment Processing

- Test Case ID: TC08
- Description: Test if digital payment works.
- Input: Select UPI payment.

- Expected Result: Payment completed and success message shown.
- Actual Result: Payment success screen displayed.
- Status: Passed

Test Case 9: Order Tracking / Dashboard

- Test Case ID: TC09
- Description: Check if admin can view orders in dashboard.
- Input: Open admin dashboard.
- Expected Result: All orders visible with status.
- Actual Result: Dashboard updated correctly.
- Status: Passed

Test Case 10: Network Failure While Scanning

- Test Case ID: TC10
- Description: Check system response during no internet connection.
- Input: Scan QR without network.
- Expected Result: “No Internet Connection” message.
- Actual Result: Message displayed.
- Status: Passed

Test Case 11: Logout Functionality

- Test Case ID: TC11
- Description: Verify that user can logout securely.
- Input: Click “Logout”.
- Expected Result: User session ends and login page opens.
- Actual Result: Logout successful.
- Status: Passed

Chapter 6. User Manual

The User Manual explains how to install, configure, and use the QR Code–Based Canteen Food Ordering System.

It includes guidelines for administrators, canteen staff, and customers to ensure smooth functioning of the system.

This manual helps users understand how to scan QR codes, place food orders, make payments, and navigate through the system's dashboard.

It also provides instructions on how the admin can update menu items, monitor orders in real time, generate reports, and manage users. By following this manual, new users can instantly start using the system without technical knowledge.

6.1 Installation Procedure

The installation procedure includes preparing the system environment, setting up the required software, configuring the database, and ensuring the QR code scanner works correctly. These steps ensure that the application runs smoothly on both server and user devices.

Step 1: Download and Extract Files

- Download the project folder from the repository or shared drive.
- Extract the folder and place it in the server directory such as:
  - XAMPP → htdocs (for PHP)
  - Node.js workspace folder (for Node/Express)
  - Django project folder (for Python)

Step 2: Install Required Software

- Install backend runtime:
  - Python 3.10+ (Django/Flask-based)
  - Node.js 16+ (Node.js-based)
  - XAMPP with PHP 7+ (PHP-based)
- Install database management software:
  - MySQL, phpMyAdmin, or SQLite
- Install IDE such as VS Code or PyCharm for editing the project.

Step 3: Install Dependencies/Libraries

- Depending on the framework:
  - For Python:
  - pip install -r requirements.txt
  - For Node.js:

- npm install

- These commands automatically install necessary libraries like:
  - QR Code scanning libraries
  - Database ORM packages
  - Image handling packages
  - UI frameworks

Step 4: Database Configuration

- Open MySQL/phpMyAdmin.
- Create a new database named: canteen_qr_system
- Import the provided SQL file (usually named canteen.sql or similar).
- Update database credentials in:
  - settings.py (Django)
  - .env file (Node)
  - config.php (PHP)
- Ensure tables such as users, menu, orders, payments, and qr_table are created.

Step 5: Running the Server

- Start Apache and MySQL from XAMPP (if using PHP).
- For Django:
- python manage.py runserver
- For Node:
- npm start

- Open the browser and visit:
- http://localhost: 8000/ (Django)
- http://localhost: 3000/ (Node.js)
- http://localhost/canteen/ (PHP)

Step 6: Admin Panel Setup

- Login using default admin credentials provided in the project.
- Add menu categories (Breakfast, Lunch, Snacks, etc.).
- Upload images and prices of all food items.
- Generate QR codes for each table/counter.
- Assign QR IDs to specific tables.

Step 7: Testing QR Scanner

- Open the system on a mobile phone.
- Scan the QR code pasted on a table.

- Verify that the correct menu is loaded.
- Place a test order to ensure order notifications reach canteen staff.

Step 8: Deployment (Optional)

If hosting online:

- Configure domain and hosting.
- Upload project files to the server.
- Set environment variables.
- Enable HTTPS for secure payments.

6.1.1 Requirements

Below are the minimum and recommended requirements for installing and running the system.

Software Requirements

Minimum Requirements

- Operating System: Windows 7/8/10/11, Linux Ubuntu, or macOS
- Backend:
  - Python 3.10+, Django/Flask
  - OR Node.js 16+
  - OR PHP 7+ (depending on the project)
- Database: MySQL 5.7 or SQLite
- Browser: Chrome, Firefox, Edge
- Code Editor: VS Code / PyCharm / Sublime
- QR libraries such as:
  - qrcode-scanner.js,

Recommended Requirements

- Latest OS version
- 8GB RAM for faster processing
- MySQL Workbench for managing database
- Postman for testing APIs
- Latest version of Google Chrome
- Updated QR code plugins for stable scanning

Hardware Requirements

Minimum

- Computer/Laptop with:
  - Processor: Dual-Core
  - RAM: 4GB
  - Storage: 250GB
- Smartphone with a working camera (for scanning QR codes)
- Printer for printing QR code labels

Recommended

- i5 or higher processor
- 8GB RAM
- Fast internet connection or Wi-Fi router
- Barcode/QR code stand for placing QR codes on tables
- Tablet device for canteen staff dashboard

6.2 **Screenshots**

Health Food Ordering

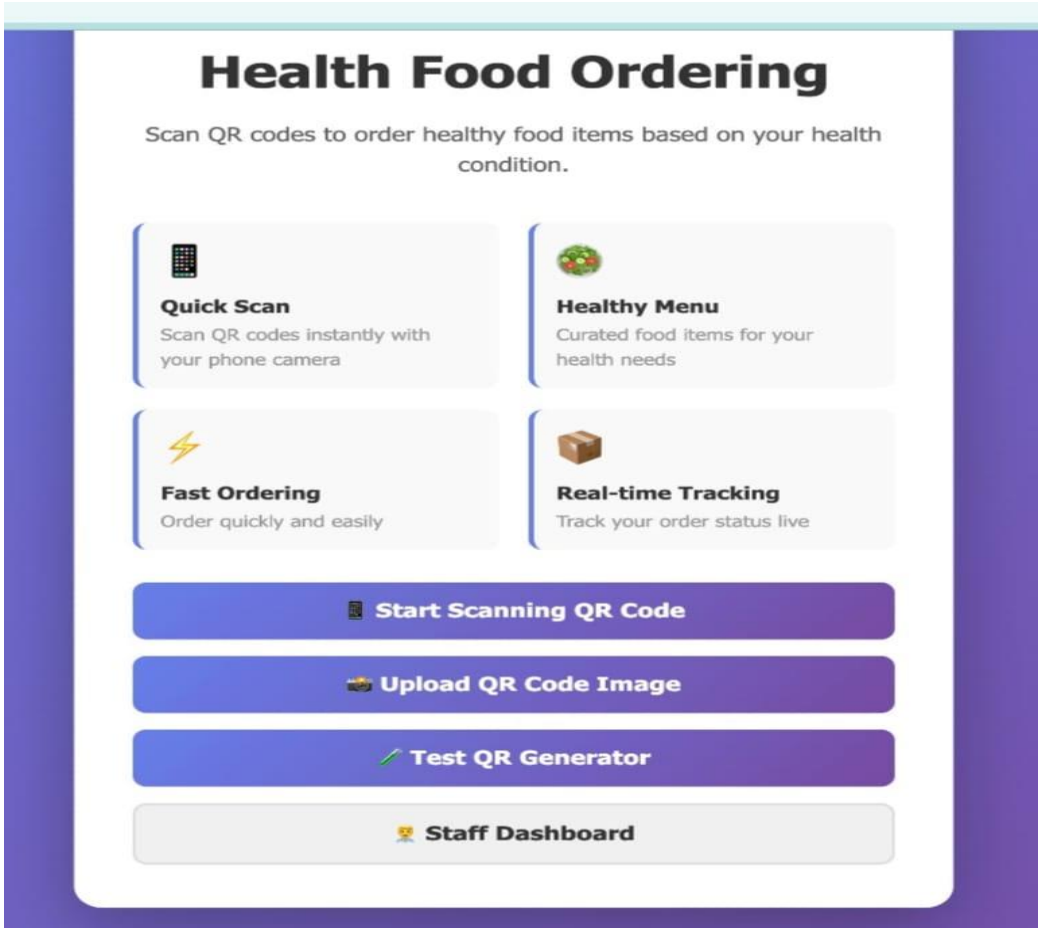

Figure 6.2.1 Health Food Ordering

Start Camera to Scan

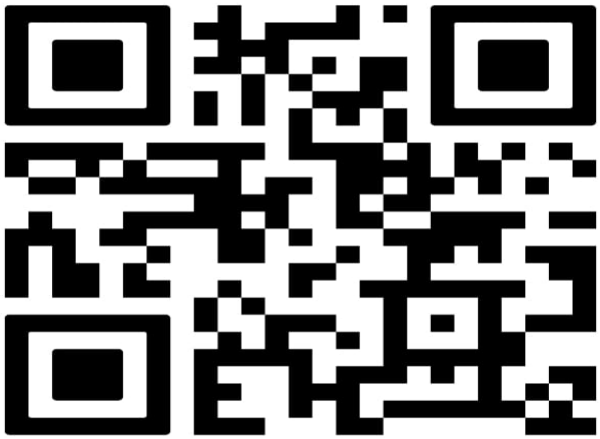

Figure 6.2.2 Start Camera

Select Health Condition

In this project, the health condition feature plays an important role in providing safe and personalized food recommendations for users. When a student or staff member registers, they can optionally provide details about their health conditions such as diabetes, high blood pressure, allergies (like nuts, dairy, or gluten), or any dietary restrictions advised by doctors. The system uses this information to filter out food items that may be harmful or unsuitable for the user. For example, a diabetic user will not be shown high-sugar items, and a person with nut allergy will be warned before ordering nut-based dishes. By integrating health condition data with the QR-based ordering flow, the system improves safety, prevents accidental consumption of restricted foods, and promotes healthier eating choices inside the canteen. This feature makes the system more user-friendly and medically conscious, supporting overall wellness and reducing risks.

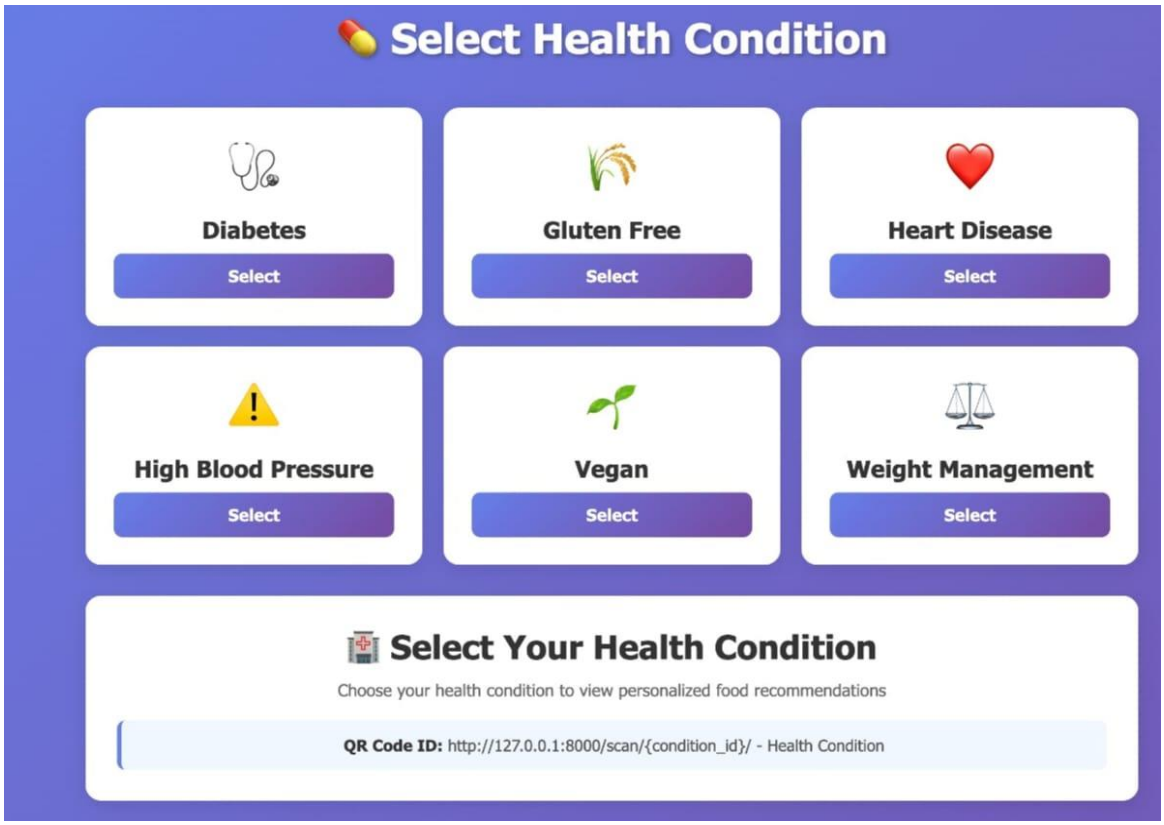

Figure 6.2.3 Select Health Condition

Recommended Food Items (Based on Health Condition)

The system intelligently recommends suitable food items by analyzing the user's healthprofile. For users with diabetes, the system suggests low-sugar and high-fibre options such as salads, chapati meals, vegetable curries, and sugar-free beverages. For individuals with high blood pressure (BP), meals low in salt and oil—such as boiled vegetables, idli, upma, and fruit bowls—are recommended. Users with allergies (nut, dairy, gluten, etc.) receive recommendations that avoid harmful ingredients; for example, lactose-intolerant users may be suggested dairy-free drinks, while gluten-allergic users are guided toward rice-based dishes. For fitness-focused or high-protein users, items like boiled eggs, sprouts, and grilled items may be highlighted. This recommendation feature ensures users make safe, healthy choices while ordering, improving both convenience and well-being.

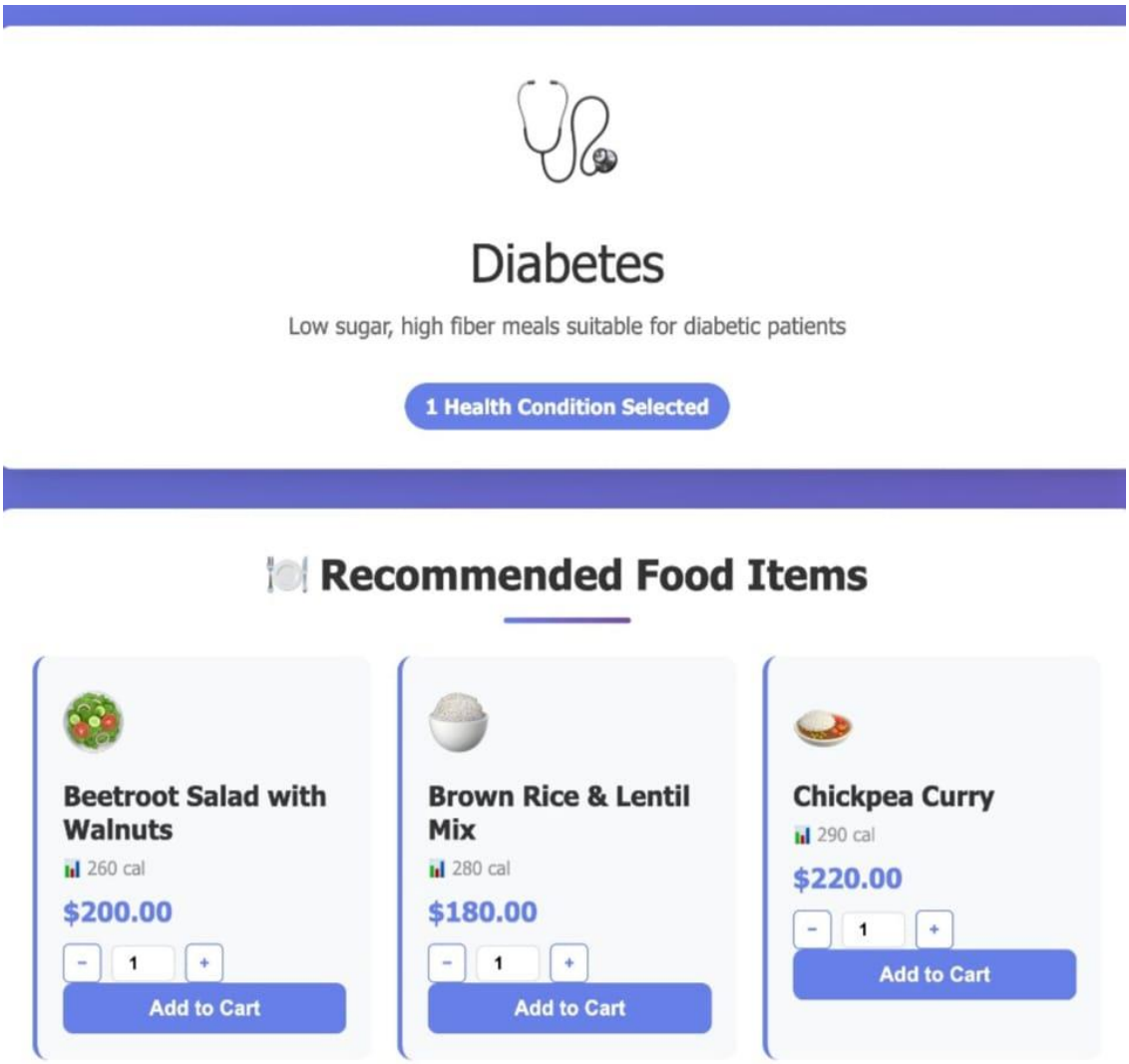

Figure 6.2.4 Recommended Food Items

QR-code Scanner

The QR code scanner is the core component of the canteen food ordering system, enabling fast and contactless access to the menu. When a user enters the canteen, they simply scan the QR code placed on the table or counter using their mobile device.

The scanner instantly reads the code and redirects the user to the digital menu assigned to that specific location. This eliminates the need for printed menus, reduces waiting time, and ensures a seamless ordering experience.

The QR scanner works with high accuracy even in low lighting and reads codes from different angles. It also enhances safety by minimizing physical contact, making it suitable for health-aware environments.

Once scanned, the system automatically retrieves the user's health profile and suggest suitable food items, making the entire ordering process personalized, fast, and efficient.

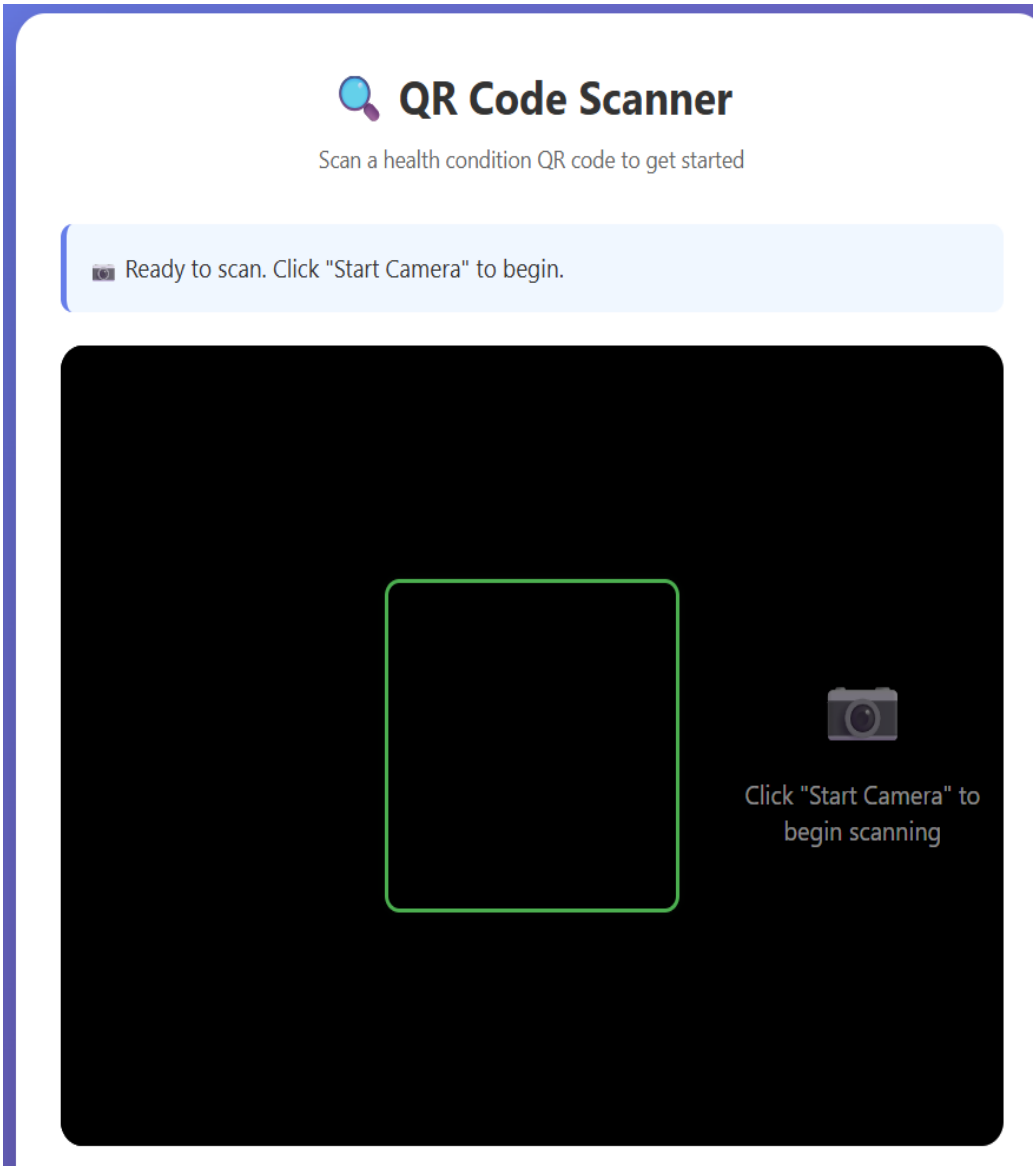

Figure 6.2.5 QR Code Scanner

QR code scanning is a fast and contactless method used to access information or services by simply pointing a smartphone camera or dedicated scanner at a machine-generated square code. In our project, the QR code is placed at the canteen counter or on tables so that students can scan it to view the food menu instantly. After scanning, the system automatically redirects the user to the ordering page, where they can select food items, view prices, and confirm their order. Once the order is submitted, it is sent directly to the canteen kitchen dashboard for preparation, reducing waiting time and crowding. This process not only improves hygiene by avoiding physical menus but also makes the ordering system more organized, efficient, and user-friendly.

Orders Dashboard

The Orders Dashboard serves as the central control panel for the canteen staff, allowing them

to efficiently manage all incoming food orders in real time. Once a customer scans the QR code and places an order, it immediately appears on the dashboard with details such as order ID, items selected, quantity, health-based alerts (if any), and order time. The dashboard is designed to be simple and organized, showing orders under different status categories such as *Pending*, *In Progress*, *Ready for Pickup*, and *Completed*. This helps the staff quickly identify which orders need immediate attention. The dashboard also updates automatically without manual refresh, ensuring smooth workflow during rush hours. Additionally, it provides staff with the ability to update order status, view previous orders, and track preparation times. Overall, the Orders Dashboard improves operational efficiency, reduces confusion, and ensures timely delivery of food, making the entire canteen management process more streamlined and reliable.

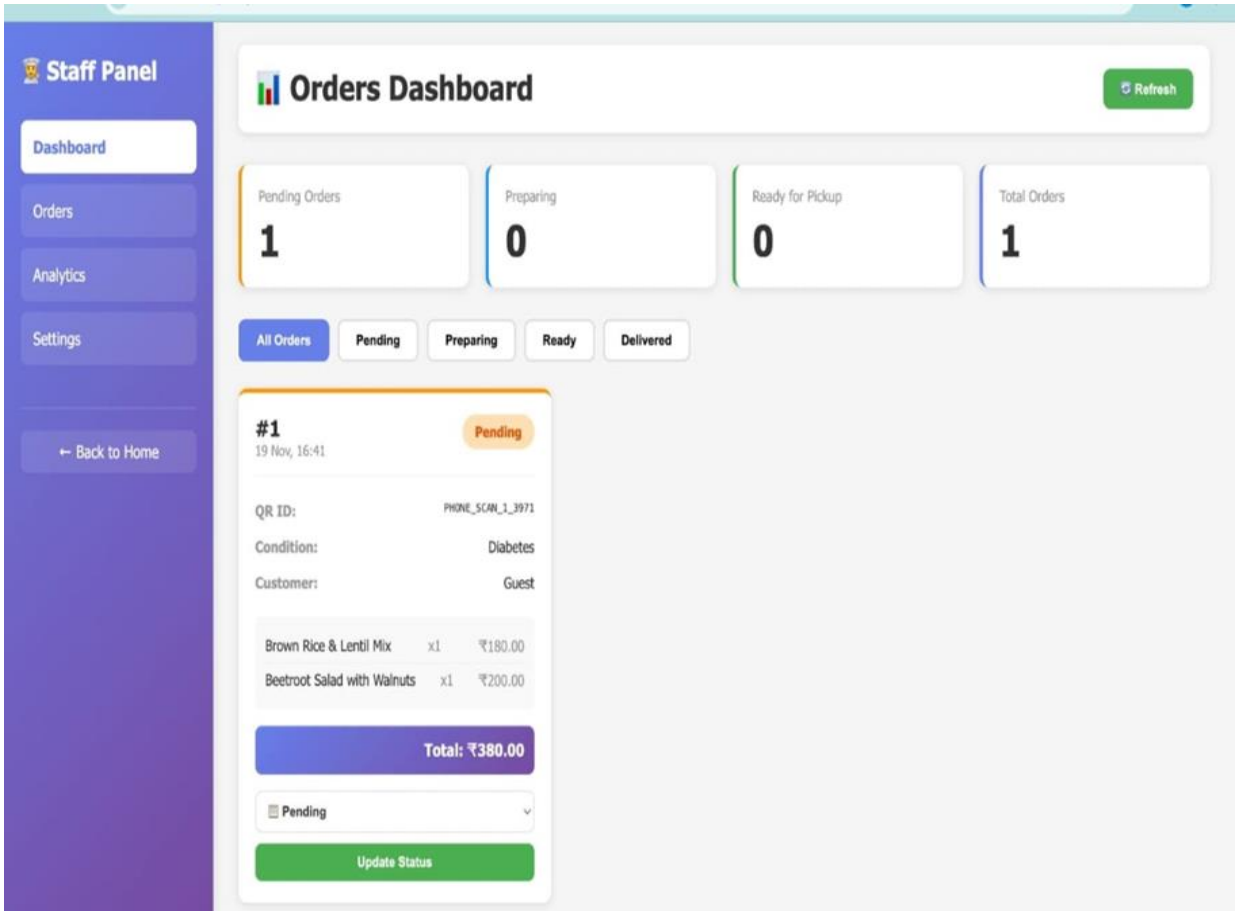

Figure 6.2.6 Order Dashboard

The User Manual explains how to install, configure, and use the QR Code–Based Canteen Food Ordering System. It includes guidelines for administrators, canteen staff, and customers to ensure smooth functioning of the system.

This manual helps users understand how to scan QR codes, place food orders, make payments, and navigate through the system's dashboard. It also provides instructions on.

The system was thoroughly tested using a series of basic functional and validation test cases to ensure smooth and error-free operation.

Form validation testing was carried out to confirm that all input forms such as user registration, login, health profile, menu updates, and order forms—accept only valid data and reject incorrect or incomplete entries. The login functionality was tested to ensure that users can access the system only with correct credentials, while invalid passwords, wrong emails, and unauthorized access attempts are properly handled with clear error messages.

CRUD operations for important modules like Food Items, Health Profiles, QR Codes, and Orders were tested to verify that new records can be created, existing entries can be viewed or updated, and unwanted data can be safely deleted without affecting system integrity.

Error handling was also tested across various scenarios such as invalid QR scans, empty form submissions, unavailable menu items, incorrect URL access, and network interruptions. In each case, the system successfully displayed user-friendly warning messages and prevented crashes, ensuring a stable, reliable, and secure user experience throughout the application**.**

6.5 Results

The project successfully provides a smart attendance system that replaces manual, paper-based methods with an automated, efficient, and error-free digital solution.

It solves the common problems of inaccurate attendance records, time-consuming entry processes, and difficulty in managing large volumes of student data.

By integrating secure login, real-time attendance marking, form validation, and smooth CRUD operations, the system ensures accurate data storage and easy retrieval.

The structured workflow and user-friendly interface help teachers manage attendance quickly, reduce human mistakes, and improve overall classroom administration. Through its streamlined design and reliable functionality, the project delivers a modern, scalable solution that enhances transparency, saves time, and improves the efficiency of attendance management in educational institution.

Chapter 7. Conclusion

The smart attendance system developed in this project provides a reliable and efficient alternative to traditional attendance methods.

By automating the process, it minimizes human error, saves time, and makes data management easier for both teachers and administrators. The system's secure login, organized workflow, and smooth CRUD operations ensure that attendance data is accurate, accessible, and well-maintained. Overall, the project successfully demonstrates how technology can simplify routine academic tasks and support better record keeping.

This solution can be further expanded with advanced features in the future, making it a scalable and practical tool for educational institutions.

7.2 Future Enhancements

The smart attendance system can be further improved with several advanced features to increase automation, accuracy, and usability. Integration of biometric authentication such as fingerprint or facial recognition can eliminate proxy attendance and improve security. Adding real-time notifications to students and parents regarding attendance status can enhance transparency and communication. A mobile application version can make the system more accessible and convenient for teachers and administrators.

Cloud storage support can ensure scalability, enabling institutions to handle large volumes of data efficiently. Additionally, incorporating data analytics and attendance trend prediction can help institutions make informed academic and administrative decisions. These enhancements would make the system more robust, intelligent, and adaptable to modern educational environments.

7.3. References

The development of this project was supported by various online resources and technical documentation. The official Django documentation was frequently used to understand concepts related to models, views, templates, and URL routing, while the Python documentation provided essential guidance on programming logic and library usage. SQLite documentation was referred to for database structuring and query handling. Information about QR code

standards and working principles was obtained from ISO-based QR code references and online technical articles. Front-end design elements were developed with the help of Bootstrap documentation. Additionally, platforms like Stack Overflow and GitHub were used to resolve development issues, learn best practices, and explore similar implementations for QR-based systems. Research papers from Google Scholar also provided insights into system architecture, optimization methods, and real-time scanning mechanisms. These collective resources played .

- **Home: http://127.0.0.1:8000/**
- **Camera Scanner: http://127.0.0.1:8000/camera/**
- **Generate Test QR: http://127.0.0.1:8000/test-qr/**
- **Staff Dashboard: http://127.0.0.1:8000/staff/**