**TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING**

**PASCHIMANCHAL CAMPUS,**

**Lamachaur, Pokhara-16**

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**A MINOR PROJECT PROPOSAL ON**

# "QR-BASED CANTEEN MANAGEMENT SYSTEM"


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## APPROVAL LETTER

The undersigned certify that they have read and recommended to the Institute of Engineering for acceptance, a project report entitled "QR-BASED CANTEEN MANAGEMENT SYSTEM" submitted by Abishek Bhandari, Anup Adhikari, Ichchha Babu Bhattarai and Nitesh Pokhrel in partial fulfillment for the degree of Bachelor of Engineering in Computer Engineering.

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With warm regards,

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# ABSTRACT

"QR-based Canteen management system" is a typical desktop application built using C# and .net framework which can be used to facilitate the serving of the food items in the canteen .The interface contains a list of food items, both available and unavailable. Menu section contains items divided into categories such as snacks, lunch, drink etc. To use the system, users have to tap on the food items they want to have, click on pay and give the print out to the person at the counter.

Traditional canteens are based on pen-paper records, cash, manual calculations, manual food coupon preparation and manual record keeping of credits which in today's time is an inefficient way to operate a business. Rendering exact changes proves to be an all-time struggle. So to overcome the disadvantages of traditional canteen management systems this system is created. It allows self-ordering and automatic amount deduction replacing the canteen staff responsible for taking order. Those willing to be the registered customer should deposit a certain amount of money. A card with a unique QR code is provided for the registered ones. By scanning the QR code and entering the valid password customer can login to this platform. Customer can pay the bill amount after selecting food items which is deducted from the personal deposited amount. Canteen owners can simply update the food items based on the categories, activate or deactivate food items based on availability and keep track of sales records.

Thus, the main purpose of developing this project is to digitize the canteen management using the current trend technologies.



Keywords:

- Desktop Application
- QR based Login System
- Self-Ordering
- Cashless Payment
- Billing System

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# CHAPTER 1: INTRODUCTION

## 1.1 Background

We are currently in the midst of a technological and computing revolution that will drastically change our lives and potentially redefine what it means to be human. Automation in many fields has replaced the old school pen and paper and at the same time proved to be more efficient, correct and less cumbersome making our life much easier. Traditional canteens are based on pen-paper records, cash, manual calculations and manual record keeping of credits which in today's time is an inefficient way to operate a business. Rendering exact changes proves to be an all-time struggle. So to overcome the disadvantages of traditional canteen management systems this "QR based Canteen Management System" has been created.

It is a food coupon system enabling users to choose food items and pay using a prepaid card instead of physical money. The system is developed as a desktop application where user logins to the system scanning a QR code followed by entering login password. All the users must get a QR card by registering with the manager and recharge the card with some amount. After login users get access to the food items, they can tap on the food items they want to have and pay bill to take coupon on the food counter. The system checks for balance and if the balance is sufficient it will be deducted automatically. The system will hold the total number of sales made by the canteen in a day or month which can be reviewed by the owner or the manager for the purpose of analysis. They can easily update, delete or create information about food categories and items. They can register new users entering their personal details. This automation process when applied on an integral part of the working people i.e. "canteen" helps reduce the service time, eliminates queues, there is no burden to provide the exact change to the staff for the order; to name a few benefits on the canteen's customer side and on the other hand it provides a reliable way of storing records and keeping the money safe as mostly the payments are made online via virtual money; benefits for the canteen owner.

## 1.2 Problem Statement

In the growing field of science and technology, expectations of the user increases and time is valuable for people. Things which were accepted in the past become unacceptable or outdated with the time.

Various problems in the canteen management can be listed below.

- The payment is done manually through cash.
- Difficulty in maintaining the sales record.
- It is tedious for canteen management to provide the change.

## 1.3 Objectives

We (students) don't feel comfortable with the way we order food items and make the payment in our college canteen. To facilitate both students and canteen owners is our main motive. The main objective of  is:

- To digitize  payment system in canteen
- To keep record of sales

# CHAPTER 2: LITERATURE REVIEW

A lot of research work has been done in relation to automated canteen ordering and management system. This section shows the self-service ordering in a canteen and previous research works and products in the field of automated canteen ordering system.

## 2.1 Mess Management System

Ankita Chawla, Priyanka Joshi, Sanjana Panjwani, Surbhi Sontakke, discussed about the importance of automation of mess management system. The authors illustrated the procedure through use case diagram and flow chart. The paper has expressed the advantages like time consuming, man power reduction and also manual mistakes. Thus they explained the automated mess management in broad sense which helps in giving an idea for writing this paper. This paper has used the proposed steps and identified other steps in the process [1].

## 2.2 In-Time Billing Process for Canteen Management System

B Muniraja, J Rajanikanth, discussed about the canteen facility provided in various campus. The paper has quoted drawback in the payment process. In it, usually cash or credit card transactions are carried which has serious drawback. Sometimes the canteen owner records the order details on paper and bill calculation will be at the end of the month. The authors explained the process of payment with recharge card through postpaid or prepaid facility [2].

## 2.3 Cashless Canteen Management System

In this paper, the author has explained about the process to automate the existing traditional system which is manual, with the support of computerized equipment and full-featured computer applications, so that their valuable data can be retained for a prolonged period of time with quick access and management. The proposed system would make use of ReactJs for frontend and NodeJS for backend. This system is generally advantageous for avoiding spending time waiting in the queue by posting orders directly to the kitchen without delay and also by scheduling orders ahead of time. It is achieved by having a card payment that reduces time spent on the bill counter for payment and tendering adjustments. It saves time and also the technique dealing with is easy. [3]

## 2.4 Existing System

### 2.4.1 IMS Canteen Management Software

IMS Canteen system is a RFID technology, user-friendly system where the customers can get and make the order on their own. It is integrated with the TOUCH POS computer so that customers can come in and press their order and give the print out to the person at the counter. It has been implemented in Kathmandu University, Dhulikhel Hospital, and KTM Eats. Its features are: touch integrated billing system, Stock management system, Sales analysis and monitoring system, Staff management system.

### 2.4.2 Deerwalk Canteen management system

Deerwalk is the leading software company of Nepal. It has implemented Canteen management since 2011, which is a centralized application built using ASP.NET, C# and MSSQL. The employees, staff and students studying in the institute can access the system. Each member has a unique id and password. After logging in members can view the menu of the day and place orders accordingly. The amount will be deducted from his/her account accordingly.

# CHAPTER 3: REQUIREMENTS ANALYSIS

## 3.1 Functional Requirements

These are the requirements that the end user specifically demands as basic facilities that the system should offer. All these functionalities need to be necessarily incorporated into the system as a part of the contract. These are represented or stated in the form of input to be given to the system, the operation performed and the output expected. They are basically the requirements stated by the user which one can see directly in the final product, unlike the non-functional requirements.

### 3.1.1 User Login

System should allow the login to the registered user who enters the valid password and registration number or QR code.

### 3.1.2 Order Items and pay

Customers can select the food items which fall under different categories based on their availability after login to the system and pay by simply clicking the pay button.

### 3.1.3 Manage products and categories

Admin can add or delete the categories and the product related to the categories. Active status of product can be changed. Admin can update the name as well as price of the products.

### 3.1.4 Register users and update user's information

Admin can register new users and provide the card with a unique QR-code. The personal information of the users can be updated as per their request. The personal balance amount of customers can be updated by admin after the confirmation of payment through online or with cash.

### 3.1.5 View Sales Details

Admin can view the sales details of the products. The total of the sales amount can be analyzed on a day to day basis.

## 3.2 Non-Functional Requirements

These are basically the quality constraints that the system must satisfy according to the project contract. They are not the requirements that are mentioned in the Software Specification Document. These requirements are auto understandable. The factors related to the reliability, performance, accuracy, security and update of database in real time falls under the non-functional requirement.

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# CHAPTER 4: METHODOLOGY

The development of this desktop based project. This system is user friendly with various controls provided by the system user interface. The system makes the overall project management much easier and flexible.

## 4.1 Development Approach

The software development approach helps us to structure, plan and control the process of developing software. Since our project is highly user interactive we decided to use an incremental software development approach.

### 4.1.1 Incremental approach

Incremental development is based on the idea of developing an initial implementation, exposing this to user comment and evolving through several versions until a complete system has been developed. It is developed as a series of versions (increments) with each version adding functionalities to the previous one.

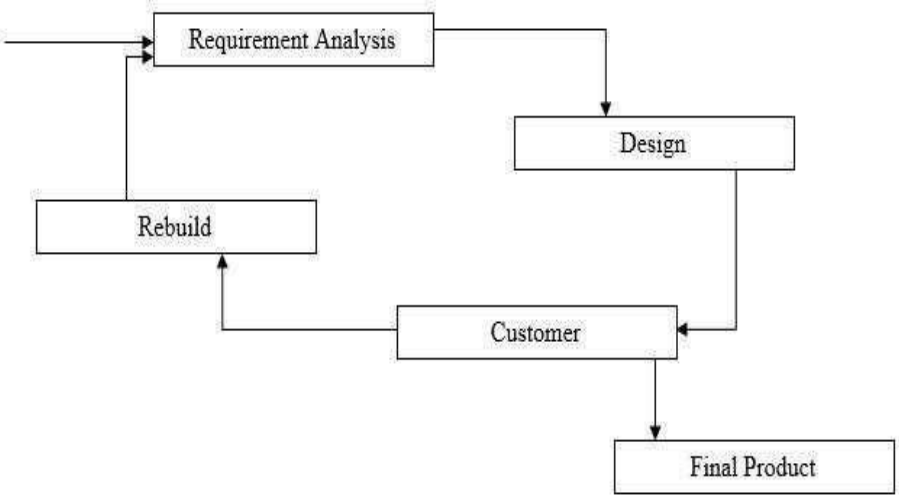


Figure 4.1.1: Incremental Approach of SDLC

**Advantages:**

- It is easier to get customer feedback on the development work that has been done.
- More rapid delivery and development of useful software to the customer is possible, even if all of the functionality has been included.

**Disadvantages:**

- Hard to identify common facilities that are needed by all increments as requirements are not defined in detail at an early stage.
- First build the initial system, then follow the repairing way of software development approach.

### 4.2 Software Tools

#### Microsoft Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs, as well as websites, web apps, web services and mobile apps. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It can produce both native code and managed code.

#### C# and .NET

C# is both a component and object-oriented language. Hence, it is a perfect programming language to use and create software components. C# programs run on .NET, a virtual execution system called the common language runtime (CLR) and a set of class libraries. .NET is an open-source developer platform. Microsoft created .NET to provide a platform where the development of different applications is possible. In addition, the platform allows you to use multiple libraries, languages, and editors. Also, it lets you develop applications or software for desktop, web, games, and IoT (Internet of Things).

## MS- SQL

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications—which may run either on the same computer or on another computer across a network (including the Internet).

## 4.3 System Design

### 4.3.1 Data Flow Diagram

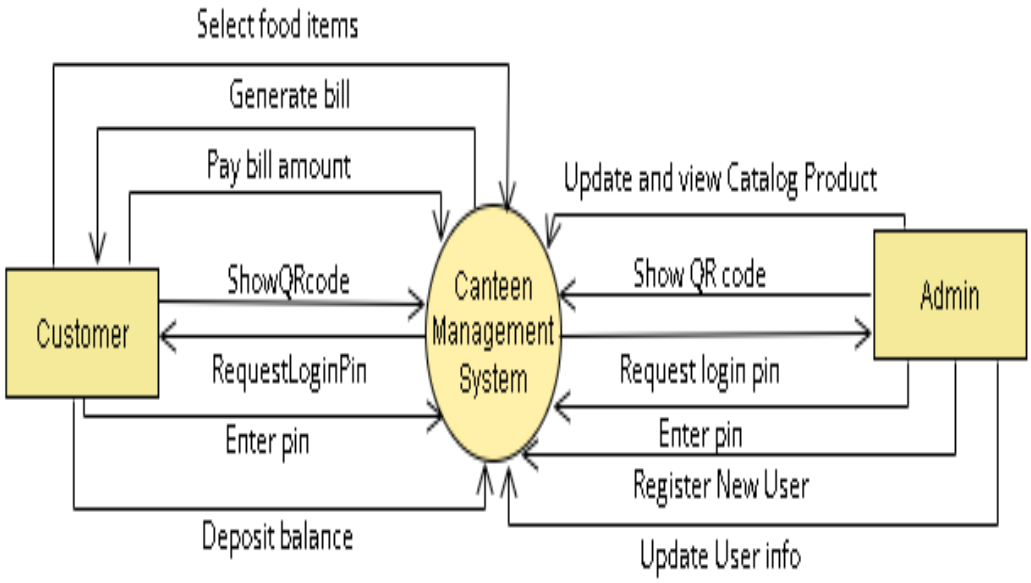


Figure 4.3.1: Data flow level-0 diagram of QR-Based Canteen management system

### 4.3.2 ER Diagram

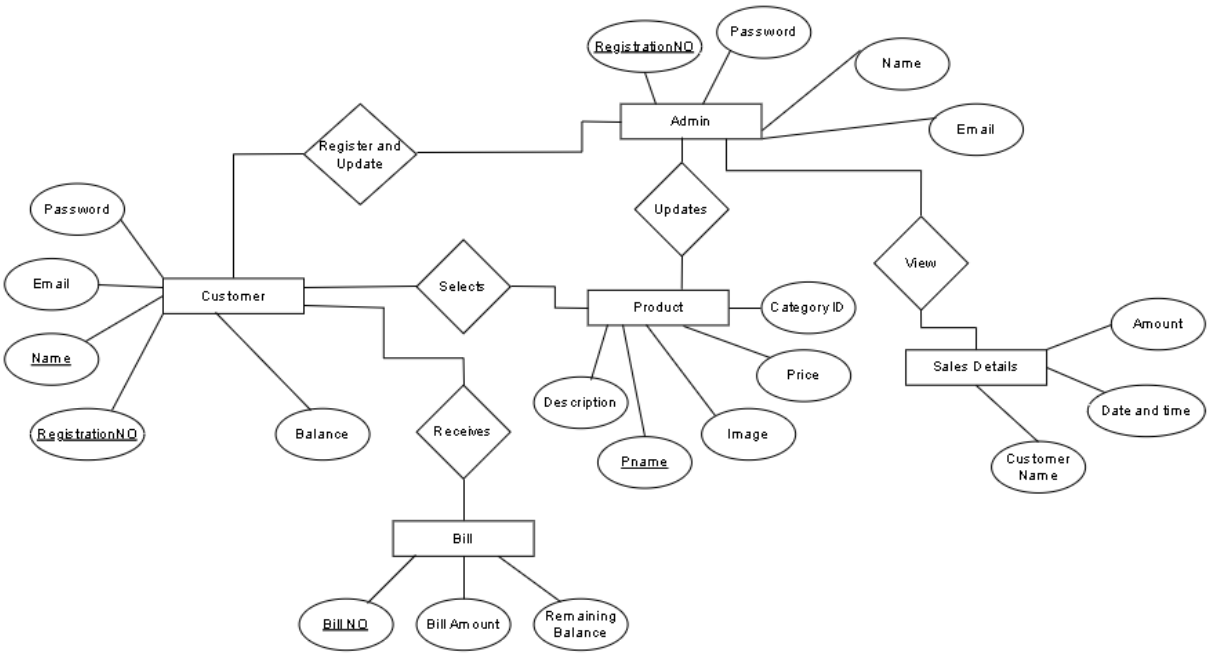


Figure 4.3.2: ER diagram of QR-Based Canteen management system

### 4.3.3 Use-Case Diagram

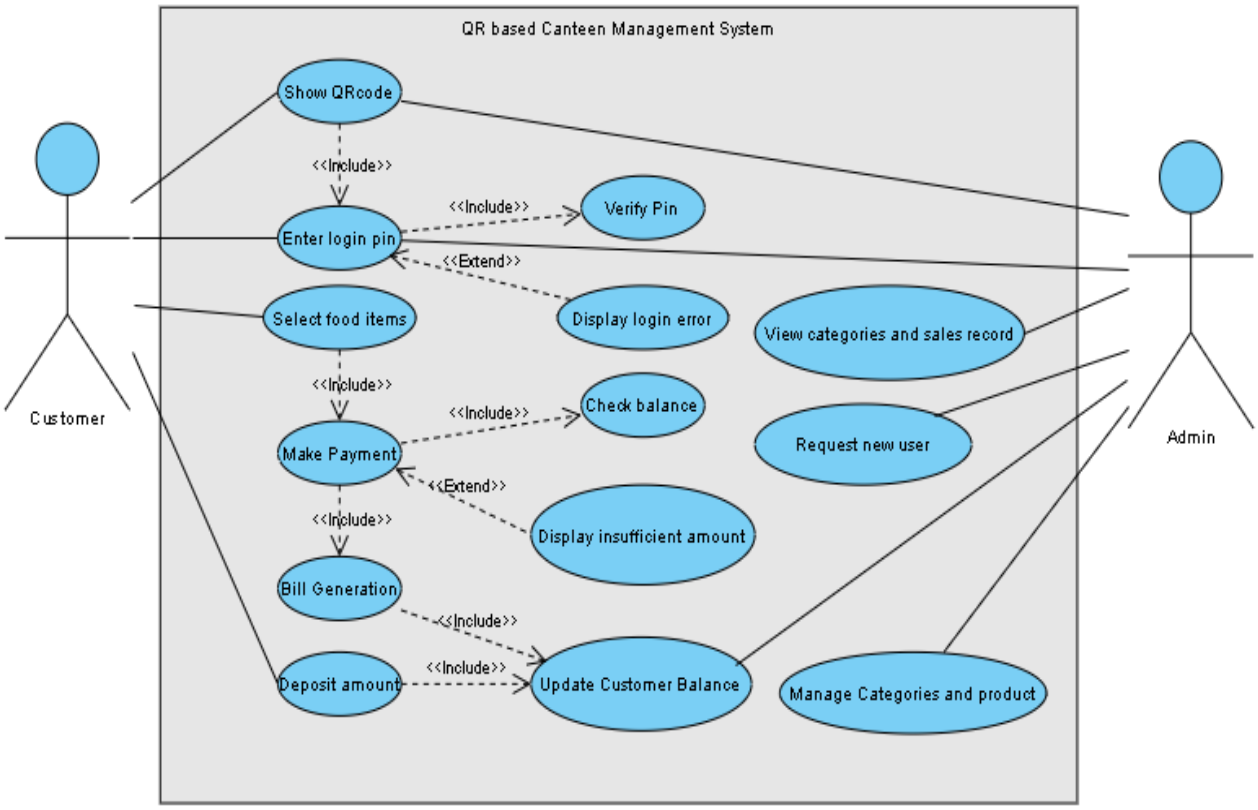


Figure 4.3.3: Use case diagram

### 4.3.4 Fully dressed Use case

| | |
|---|---|
| Use Case Id: | UC1 |
| Use Case Name: | Login |
| Primary User | Admin/Customer |
| Stakeholder Interest | User wants to login to the system |
| Preconditions | User must show valid QR or enter registration number and login pin |
| Post Condition | User is directed to menu Page |
| Main Success Scenario | Users must enter a valid registration number or show valid QR and enter the correct pin.<br>Users must submit details.<br>System should validate the user.<br>User is directed to the menu Page. |
| Alternative Flow | Missing registration number and pin:<br>1. System prompts registration number and pin.<br>Invalid username or QR and pin:<br>1. System denied for login displaying incorrect registration number and pin.<br>2 System prompts to enter valid registration number and pin. |

Table 4.3.1: Fully Dressed Format Use Case for Login

| | |
|---|---|
| Use Case Id: | UC2 |
| Use Case Name: | Manage customer details and food items |
| Primary User | Admin |
| Stakeholder Interest | User wants to :<br>Update the categories and products.<br>Update the personal information and balance of a customer.<br>View sales details. |
| Preconditions | Users must be logged in to the system. |
| Post Condition | Different updates are seen on categories, products and personal info about customers. |
| Main Success Scenario | Users must enter a valid registration number or show valid QR and enter the correct pin.<br>Users must submit details.<br>System should validate the user.<br>User updates the details.<br>System displays the update message. |
| Alternative Flow | Missing registration number and pin:<br>1. System prompts registration number and pin.<br>Invalid username or QR and pin:<br>1. System denied for login displaying incorrect registration number and pin.<br>2 System prompts to enter valid registration number and pin.<br>Invalid update :<br>System denied for update on if the updated entries do not match the data types and does not satisfy the constraints. |

Table: 4.3.2: Fully Dressed use case to update products and customer details

| | |
|---|---|
| Use Case Id: | UC3 |
| Use Case Name: | Order of food items and payment |
| Primary User | Customer |
| Stakeholder Interest | User wants to order food items and make payment |
| Preconditions | Users must be logged in to the system. |
| PostCondition | User gets the bill |
| Main Success Scenario | Users must enter a valid registration number or show valid QR and enter the correct pin.<br>Users must submit details.<br>System should validate the user.<br>User selects the food items.<br>System compares the customer balance and bill amount.<br>User gets the printed bill. |
| Alternative Flow | Missing registration number and pin:<br>1. System prompts registration number and pin.<br>Invalid username or QR and pin:<br>1. System denied for login displaying incorrect registration number and pin.<br>2 System prompts to enter valid registration number and pin.<br>Insufficient balance:<br>1. System displays insufficient balance and requests the user to recharge the card. |

Table: 4.3.3: Fully Dressed use case to order food items and payment

| | |
|---|---|
| Use Case Id: | UC3 |
| Use Case Name: | Log Out |
| Primary User | Registered user |
| Stakeholder Interest | User wants to log out from the system |
| Preconditions | Users must be logged in to the system. |
| PostCondition | User must be logged out and login page is displayed for another user |
| Main Success Scenario | Log Out |

Table: 4.3.4: Fully dressed use case for log out

### 4.3.5 Database Design

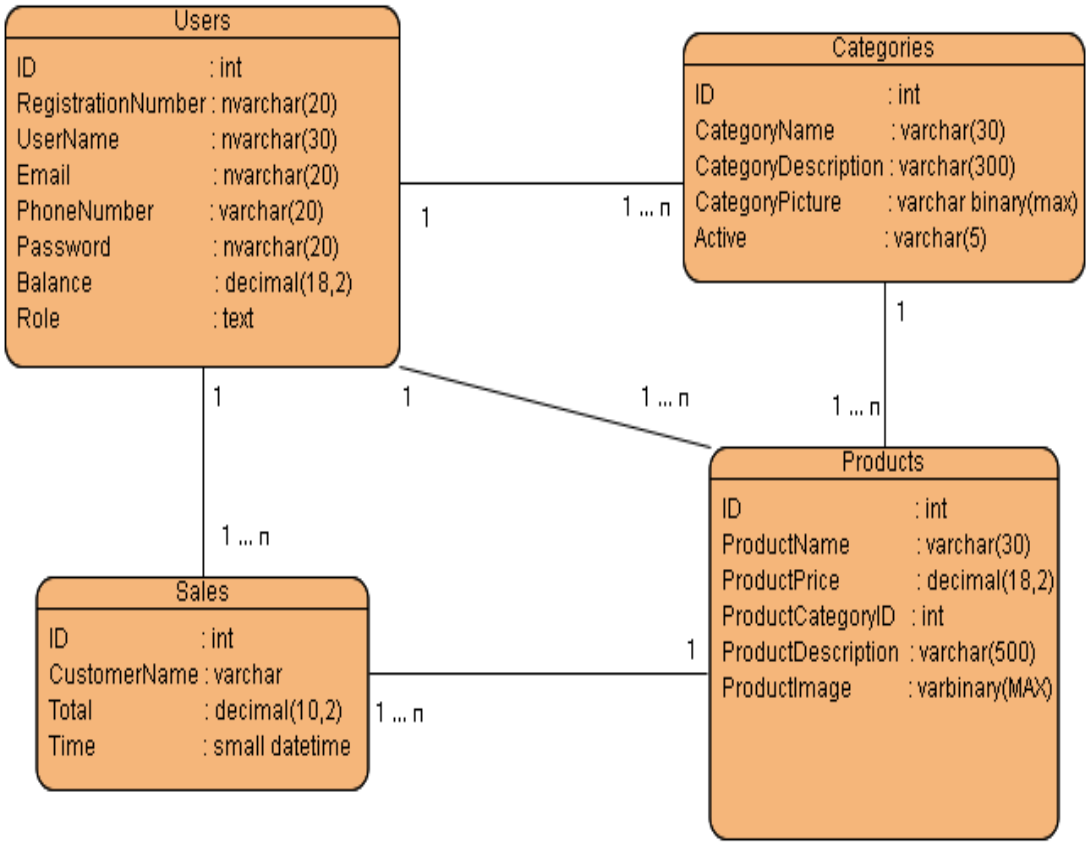


Figure 4.3.5: Database design of QR-Based Canteen Management System

### 4.3.6 Sequence Diagram

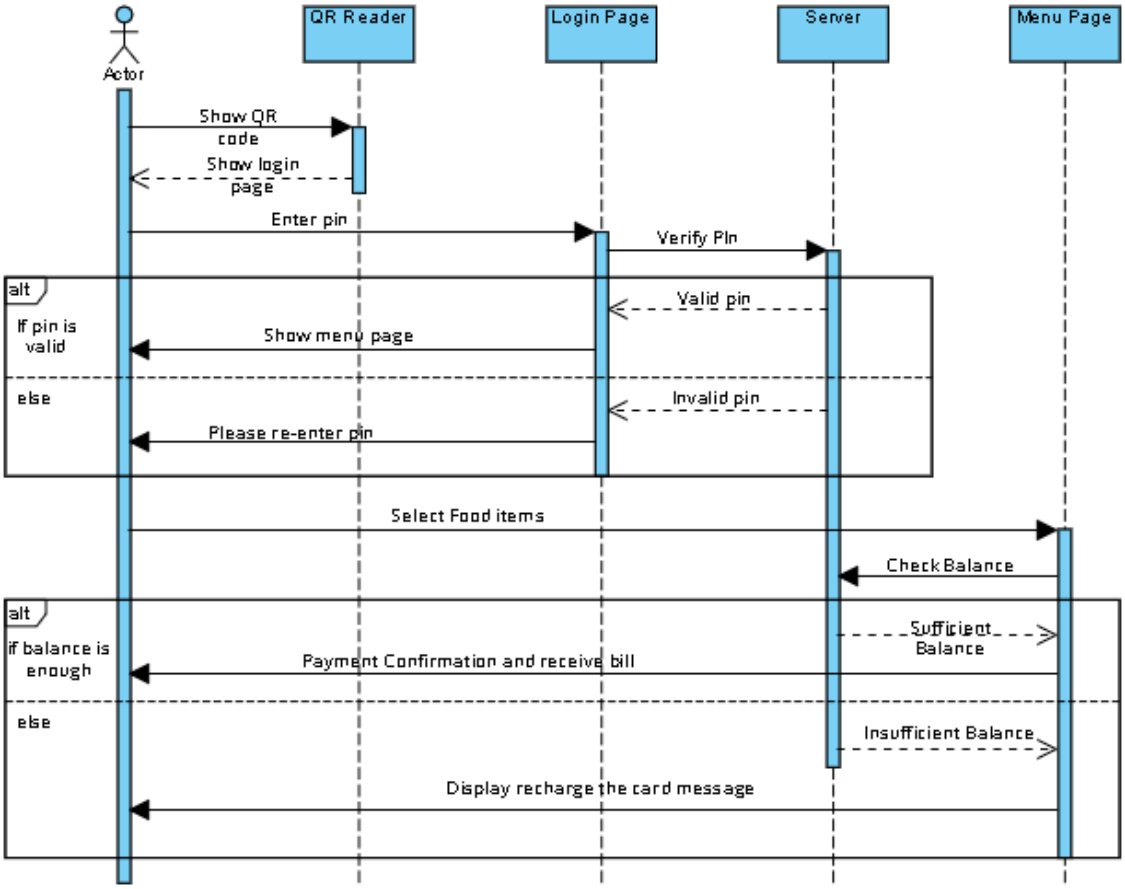


Figure: 4.3.6: Sequence Diagram for QR-based Canteen Management System

### 4.3.7 Activity Diagram

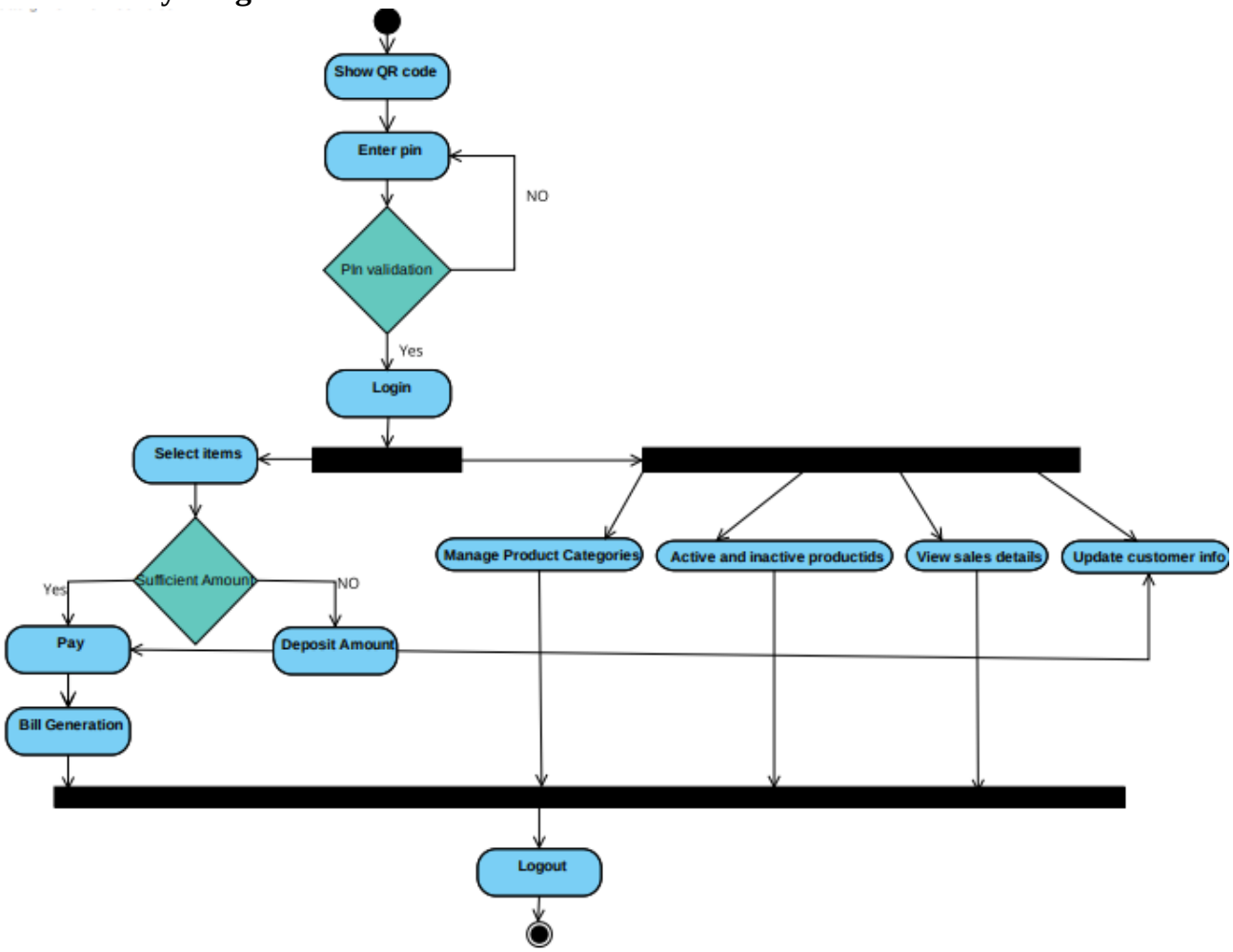


Figure: 4.3.7: Activity Diagram for QR-Based Canteen Management System

### 4.3.8 Class Diagram

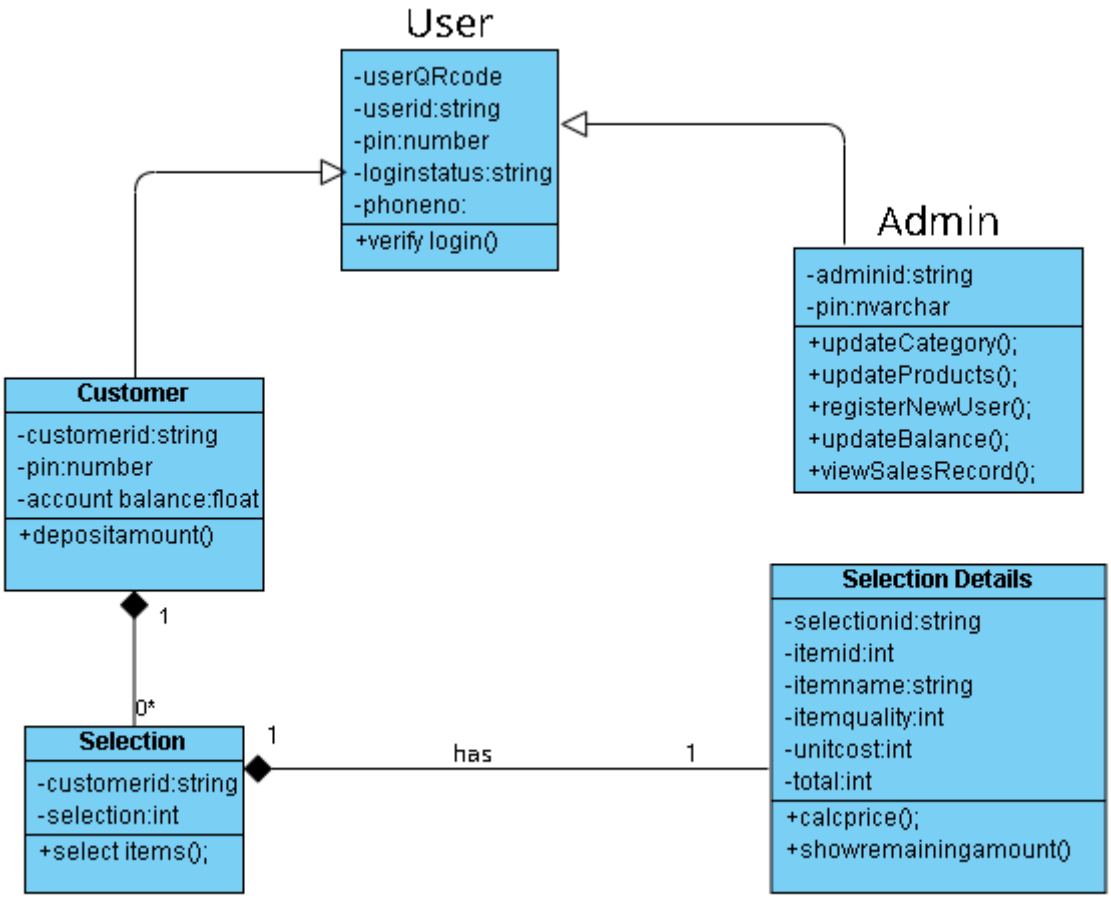


Figure: 4.3.8: Class-Diagram of QR-Based Canteen Management System

# CHAPTER 5: EPILOGUE

## 5.1 RESULT AND DISCUSSION

The result of this system provides a computerized version of Canteen management system which will benefit the customers as well as the owners of the canteen. Customers can login, view menu and order on their own. They can pay using virtual cash instead of physical money and food coupon will be printed out that can be shown at counter to obtain the desired food. It automates the order preparation, sales recording activities performed by the canteen staff. There is no need to return the exact change. Canteen owners can analyze the sales, manage the food items and manage the customer details. In this way it benefits both the owner and customers.

Few glimpse of this project

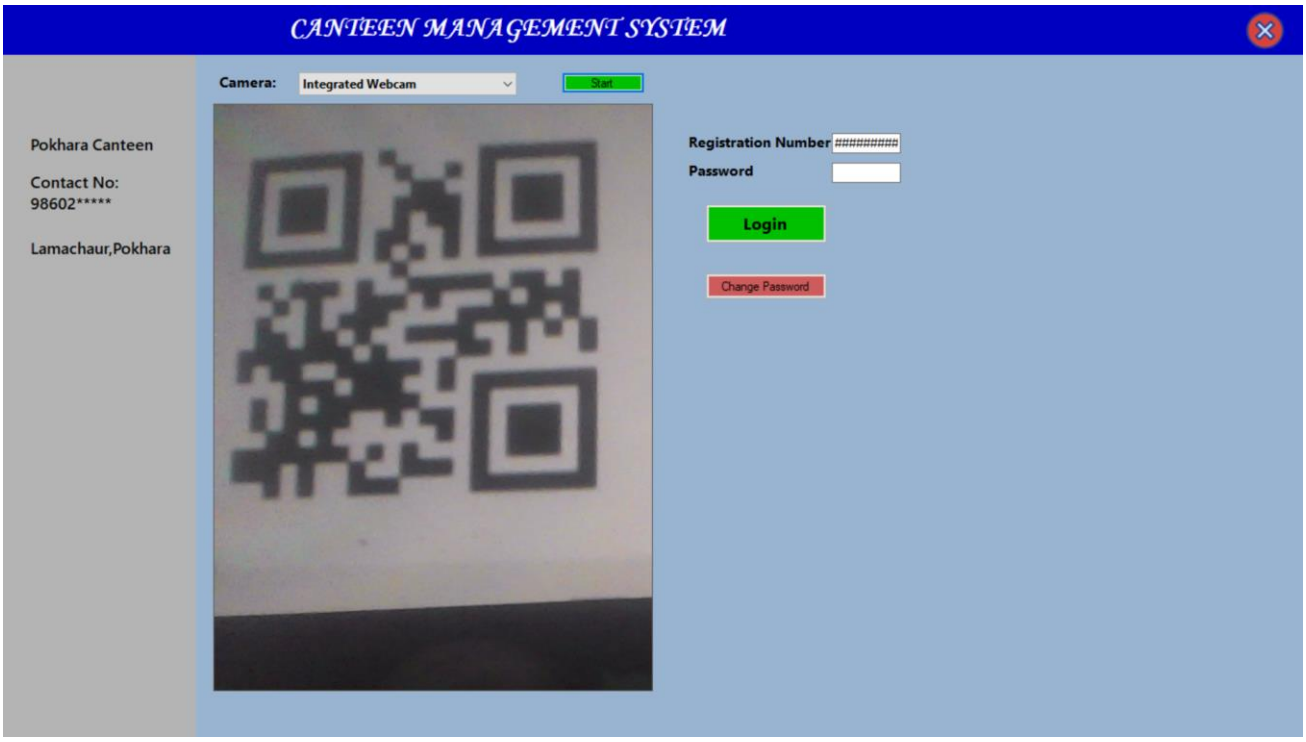


Figure: 5.1.1: Login window

It is the initial window of the system. In this window users show the provided QR code and enter the password for login. They can also change their current password.

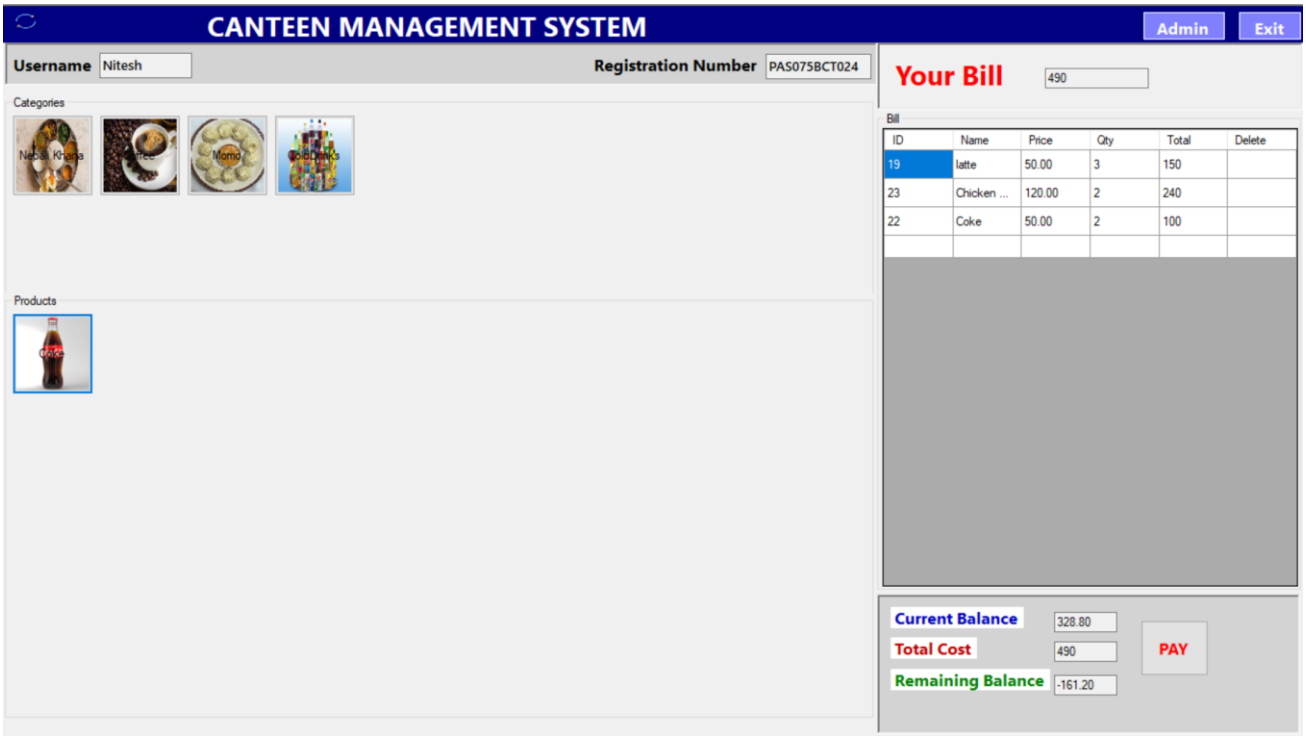


Figure: 5.1.2: Food Menu and Billing Window

In this window users can view the food items divided into categories. They can select the food items by clicking on them and it will appear on the bill. Quantity of the item can be increased or decreased. Based on the item selected and quantity total cost and remaining balance appears. If there is sufficient balance payment can done by clicking on pay button. After payment bill is printed out and the sales is recorded. The system redirects to login.

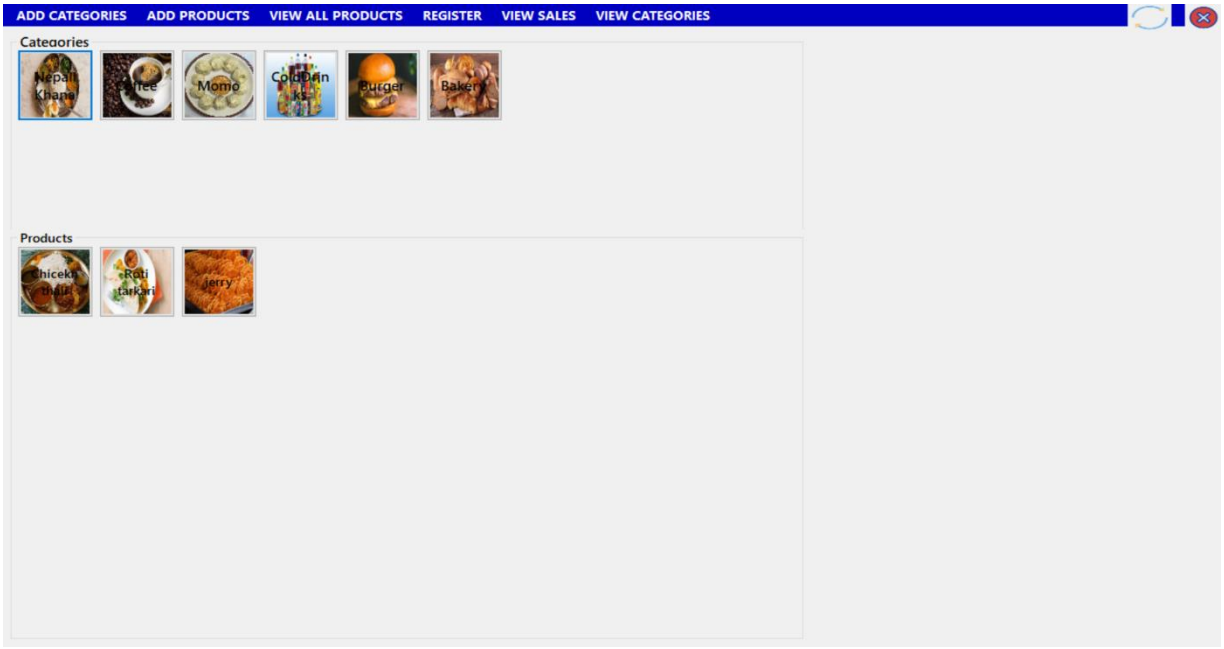


Figure: 5.1.3: Admin Panel

This window can be accessed by admin only after login. In this page admin can add categories, products, view all products, view all categories, manage users and view sales by date.

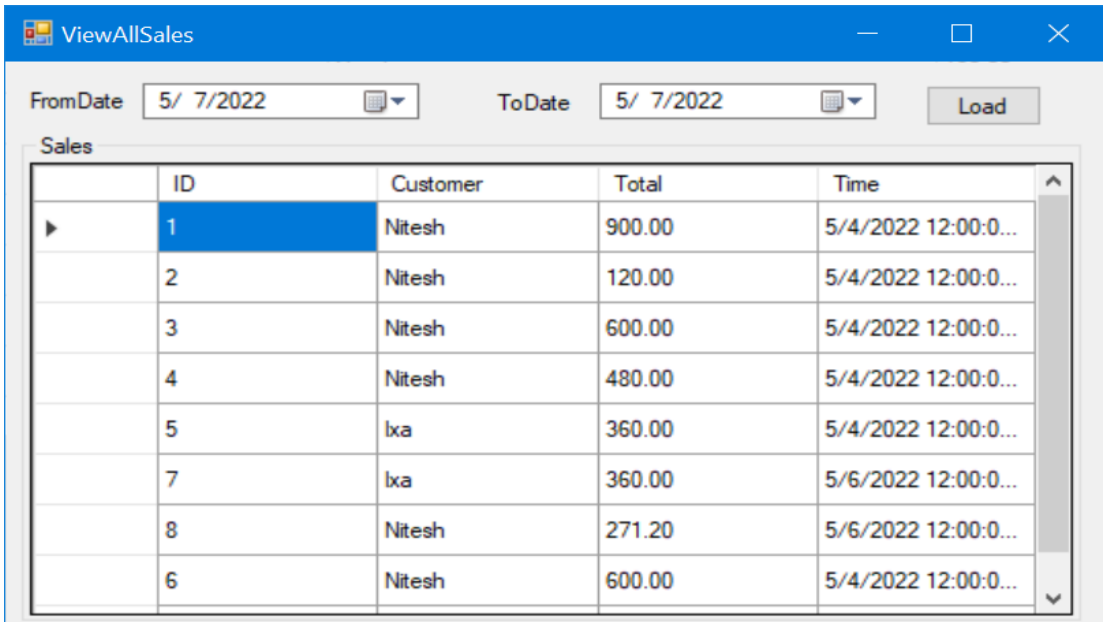


Figure: 5.1.3: Sales details

In this window admin can view all sales details made till now or filter the sales by date.

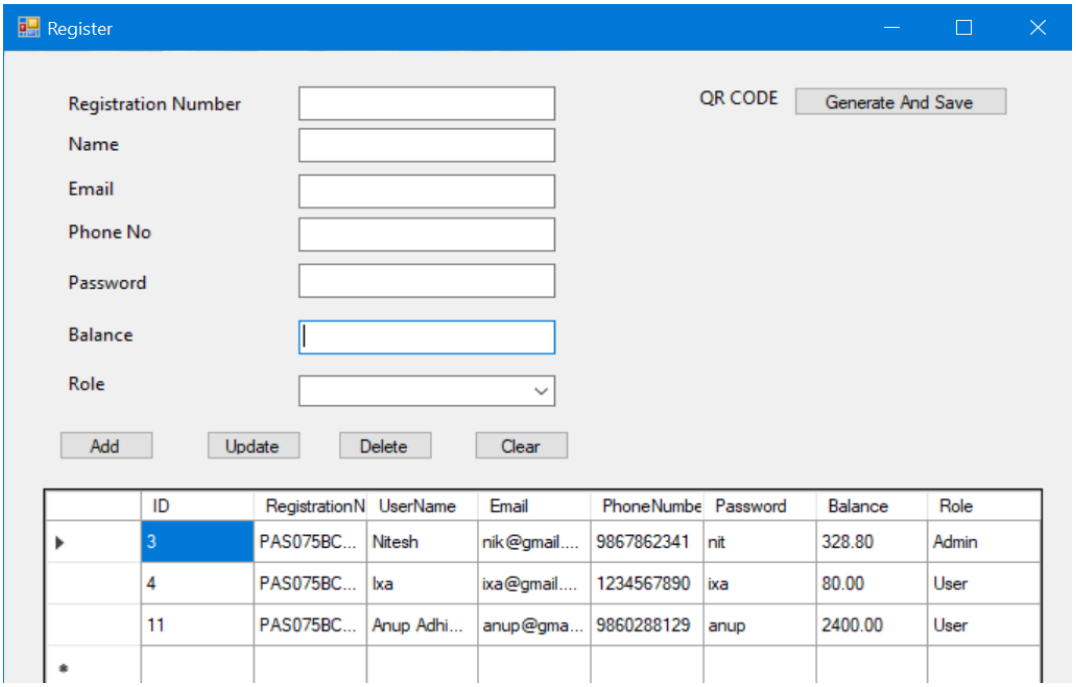


Figure: 5.1.4: Window to register new user

If a user wants to use this system he/she has to contact the administration, provide his details and deposit certain amount. Then admin will add the details of user into the database using this window. It has fields for entering user details. QR code corresponding to the registration number can be generated and printed out for providing to the users. Admin can view all the registered users, update the user details of registered users like balance or delete the users.

## 5.2 Conclusion and Future Works

This automation process when applied on an integral part of the working people i.e. “canteen” helps reduce the service time, eliminates queues, there is no burden to provide the exact change to the staff for the order to name a few benefits on the canteen’s customer side and on the other hand it provides a reliable way of storing records and keeping the money safe as mostly the payments are made online via virtual money; benefits for the canteen owner.

There are certain areas in the system that can be improved. The better UI design can be done. Fixed food items can be made available based on the day. Feedback feature can be added where members can place comments, like/dislike the items and submit suggestions. Likewise inventory management, sales vs. purchase management, staff management system can be added. This system can be made online too.

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