Software Requirements Specification

for

AR Bakery Application

Version 1.0 approved

Prepared by <Group No. 1>

<Section No. 5216>

<14 October, 2021>

Table of Contents

Table of Contents ii

Revision History ii

1. Introduction 1

1.1 Purpose 1

1.2 Document Conventions 1

1.3 Intended Audience and Reading Suggestions 1

1.4 Product Scope 1

1.5 References 1

2. Overall Description 2

2.1 Product Perspective 2

2.2 Product Functions 2

2.3 User Classes and Characteristics 2

2.4 Operating Environment 2

2.5 Design and Implementation Constraints 2

2.6 User Documentation 2

2.7 Assumptions and Dependencies 3

3. External Interface Requirements 3

3.1 User Interfaces 3

3.2 Hardware Interfaces 3

3.3 Software Interfaces 3

3.4 Communications Interfaces 3

4. System Features 4

4.1 System Feature 1 4

4.2 System Feature 2 (and so on) 4

5. Other Nonfunctional Requirements 4

5.1 Performance Requirements 4

5.2 Safety Requirements 5

5.3 Security Requirements 5

5.4 Software Quality Attributes 5

5.5 Business Rules 5

6. Other Requirements 5

Appendix A: Glossary 5

Appendix B: Analysis Models 5

Appendix C: To Be Determined List 6

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Date** | **Reason For Changes** | **Version** |
|  |  |  |  |
|  |  |  |  |

# Introduction

## Purpose

The purpose of this SRS document is that it will completely describe and provide a working example of all the details of our open-source Augmented Reality application. It is made for the users and developers of this application software. The document details the purpose, features, interfaces, functions, and constraints that will be imposed on the application.

## Document Conventions

This System Requirements Software (SRS) document is based on the IEEE requirements. Main headings in this document have a font of 18 and are Bold, Subheadings in the document have a font of 12 or 14 and are also bold and the text under the subheadings have a font of 11.

## Intended Audience and Reading Suggestions

The document is intended for:

1. The developers who are interested in making this project.
2. The programmers who are interested in maintaining this application and solving the bugs that arise over time.

  iii.          The client, who requested the application for his bakery.

iv.          The users who will use this application.

## Product Scope

This Bakery Augmented reality application is software that can be used to analyze, customize and order bakery items. The app can be used to see the model of a particular item through a camera lens. It is used to search and browse those items and then order them online through the app. The customers can place their online orders instead of visiting the bakery without any hassle and hence save time. Financially the app can boost the business revenue as the customers have a direct connection with the bakery, there is a better return on investment and it reaches a target audience.

## References

The template specified by the IEEE for the SRS Document:

<https://goo.gl/nsUFwy>

https://www.academia.edu/35020728/Software\_Requirements\_Specification\_Restaurant\_Menu\_and\_Ordering\_System

# Overall Description

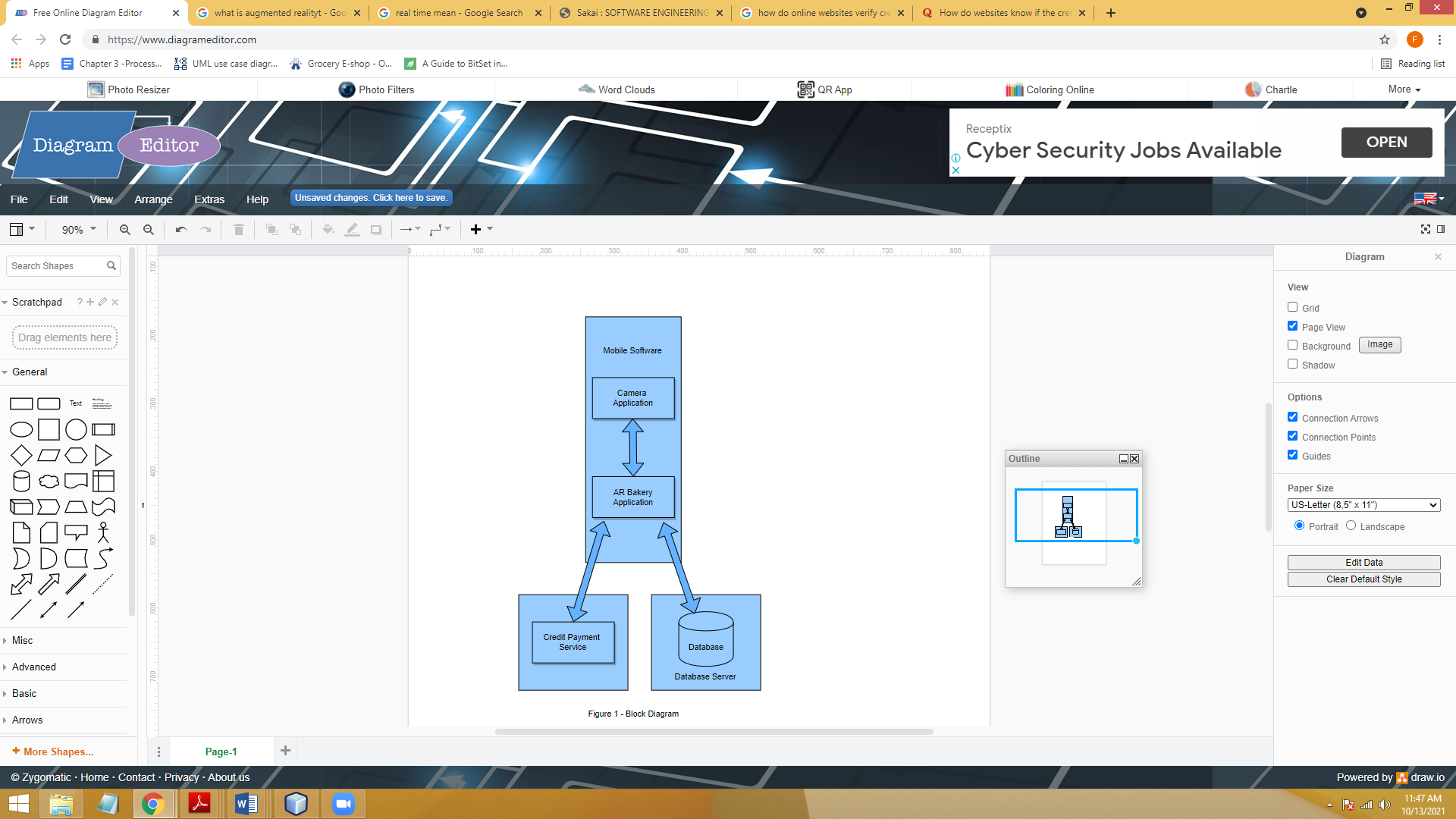
This section will provide an overall description of the software product. The context of the software will be explained and the functionality of the system will be discussed. It will also mention the different types of stakeholders using the software system and the characteristics of each type. Along with this, the following subsections will describe the environment in which the software will operate, the constraints, user documentation, and assumptions for the software system.

## Product Perspective

The system consists of one mobile application which will serve as an easy-to-use online shopping platform.  With an in-built augmented reality feature, the customers will be able to easily visualize the items before placing an order. Their order details and records will also be maintained to ease future order placements for the customers.

The application software will facilitate customers of a bakery shop by providing an interactive online ordering experience. The customers will be using the application to view the various bakery items, visualize them in augmented reality, and place an order. As shown in Figure 1, the application will be utilizing access to the camera application within the mobile for providing the augmented reality experience.

As the application will also allow the user to place an order, a database is integrated into the application to store, modify, and retrieve relevant data. The application will be storing and modifying customer order data in real-time. It will also be using the database for retrieving 3-dimensional images of the selected bakery items to display them in augmented reality. For registering new customers and authenticating existing customers, the application will frequently work with the database for efficient data management. Lastly, if the customer chooses credit card as the payment method, the application will verify the entered credentials from the credit payment service.



## Product Functions

Before access to the features of the application, the customer will be required to log in using valid credentials. In the case of new customers, the application will redirect them to a sign-up page. The customer account will consist of details such as customer full name, phone number, email address, delivery address, and order summary. Customers can modify their account details at any time.

Once successfully logged into the mobile application, the customers will be able to view bakery items and place an order online. For viewing the items, the customer can choose to either search for an item directly through a search bar or browse through items within a selected category. The result of the direct search will be the item displayed on the user screen. The customer can then opt for experiencing the searched item in augmented reality and visualize different flavors, toppings, sizes, and other related details.  Similarly, the customer can browse through the available bakery items by scrolling and select an item to view in augmented reality.

Simultaneously, there will be an option for adding the selected item to the cart. The application will allow the customer to view and update the shopping cart if required. Following this, the customer can place an order by checking out.

## User Classes and Characteristics

There are two categories through which users of this particular application have been defined, they’re either going to be registered customers who have individual accounts, or they are going to be visitors. The latter are potential customers and will, therefore, have to sign up to create an account to save their personal information and update addresses. All users require only a basic understanding of mobile applications and the systematic processing of touchscreens.

## Operating Environment

The application is designed to run on any device which is compatible with the Android operating system. The application will heavily rely on and use android input-output ports to achieve successful end conditions and display AR effectively. Input can be given through the touch screen as the user swipes and clicks on their preferred items. Output can be received by the screen as the augmented version of the items will be displayed. The application will have access to the back camera and will take help from sensors to detect rotation.

## Design and Implementation Constraints

The mobile application is constrained by the system interface to the GPS navigation system within the mobile phone. Since there are multiple GPS manufacturers, the interface will most likely not be the same for every one of them. Also, there may be a difference between what navigation features each of them provides.

The internet connection is also a constraint for the application. Mobile devices must be connected to the internet for the app to function.

The mobile application will also be constrained by the capacity of the database.

## User Documentation

* A description document that gives a detailed overview of the product with all the services offered by the product. End-users read this document and decide if this is the product he is looking for or not.
* A user manual intended to assist users on how to use the application safely, healthily, and effectively.
* An installation guide that has detailed information on installing and setting up the application.
* Technical documentation that explains the use, functionality, creation, or architecture of a product.

## Assumptions and Dependencies

One assumption about the product is that it will always be used on mobile phones that have enough performance. If the phone does not have enough hardware resources available for the application, for example, the users might have allocated them with other applications, there may be scenarios where the application does not work as intended or even at all.

# External Interface Requirements

Coming later.

# System Features

<This template illustrates organizing the functional requirements for the product by system features, the major services provided by the product. You may prefer to organize this section by use case, mode of operation, user class, object class, functional hierarchy, or combinations of these, whatever makes the most logical sense for your product.>

## 4.1 Account Supervision

4.2.1 Description and Priority

The Account Supervision is a feature that manages the user accounts on the application. It signs up the user, logs the user in, provides a customer authentication on the backend, deletes, views and updates the user account. It is a high priority feature since without an account, the customer will not be able to use the application and order items from the bakery.

4.2.2 Stimulus/Response Sequences

Sign-up: The user selects the “Register Now” option. They are then redirected to input their First Name, Last Name, Address, Phone Number, Email Address, and Password. The information is checked for validity and if there are any discrepancies, the user is alerted to re-enter their information otherwise the user is registered and a verification email is sent.

Sign-in: The user selects the “Sign-in” option and enters their Email Address and Password. The information is checked for validity and if there are any discrepancies, the user is alerted to re-enter their information otherwise the user is logged into their account.

Customer Authentication: The user will provide the login details.

Remember Me: The user checks the “Remember Me” box and presses the login button. The system will save the user’s login credentials so that the user does not need to re-login to access the application.

Delete Account: A logged-in registered user presses the delete account button in the change account settings screen. The system asks the user to re-enter the password for the account. Entering the correct password successfully deletes the user’s account.

View / Update Account Details: The user accesses their profile. The user edits the details within the account settings and the application verifies the user by asking the user’s password again.

Forgot Password: A registered user presses the forgot password button on the login screen. The system asks the user to enter the email address linked with the account. Entering the correct code that is sent to the email address will reset the account’s password. The user will be asked to enter a new password and returned to the login screen after successfully saving the new password for the user.

Logout: The user clicks on the “Account” button from the application menu. The application will proceed to the login page after displaying the message, “Account Signed out” displayed.

4.2.3 Functional Requirements

REQ-13: The app will authenticate users using log-in details.

REQ-14: The app will sign-up new customers.

REQ-15: The app should be able to remember signed up customers.

REQ-20: The user shall be able to view account settings.

REQ-21: The user shall be able to update their account settings.

REQ-22: The user shall be able to log out from the system.

REQ-23: The user can delete the account.

REQ-24: The user can reset the password through email in case they forget the password.

|  |  |  |
| --- | --- | --- |
| Use case name | | Sign-Up |
| Related requirements | | 14 |
| Goal in context | | Register for a new account in the app. |
| Preconditions | | The user has downloaded the app. |
| Successful end condition | | A message is displayed showing that the account is created and the user has registered. |
| Failed end condition | | Information provided for creating an account is invalid.  Some information is not filled.  An error message appears to re-enter valid information to proceed further. |
| Primary actors | | New customer, Authentication service. |
| Secondary actors | | None |
| Trigger | | The user selects the register now button.  Users enter their information in the spaces provided.  The user confirms his registration through a “Register” button. |
| Included cases | | None |
| Main flow | Step | Action |
|  | 1 | Users opt to register and create a new account for the app. |
|  | 2 | They enter their first name, last name, address, phone number, email, and password. |
|  | 3 | The information is checked for validity. |
|  | 4 | A verification email is sent. |
|  | 5 | The user is then registered as a new customer. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Use case name** | | | **Sign-in** | | | |
| Related requirements | | | 13 | | | |
| Goal in context | | | The user logs into the account that they created for this app. | | | |
| Preconditions | | | The user has registered for the account. | | | |
| Successful end condition | | | The customer successfully logs into his account. | | | |
| Failed end condition | | | The user enters invalid information.  The error message is shown and the user is said to re-enter his information. | | | |
| Primary actors | | | Registered Customer. | | | |
| Secondary actors | | | None | | | |
| Trigger | | | The user selects the sign-in button.  They are redirected to enter their information to log into their account. | | | |
| Included cases | | | Sign-up | | | |
| Main flow | | | | | Step | Action |
|  | | | | | 1 | The user opts to sign into their account. |
|  | | | | | 2 | They enter their email and password. |
|  | | | | | 3  Include: Customer Authentication | Information is verified. |
|  | | | | | 4 | The user logs in to his account and is given access to the application. |
| Use Case Name | **Customer Authentication** | | |
| Related Requirements | 13,14 | | |
| Goal In context | To only allow authorized users to access the system. | | |
| Preconditions | The user has already signed up. | | |
| Successful End Condition | The application displays the message,  “Successfully Authenticated”. | | |
| Failed End Condition | The application displays the message,  “Invalid Login” | | |
| Primary Actors | Registered Customer | | |
| Secondary Actors | Authentication (Service) | | |
| Trigger | The user will provide the login details. | | |
| Included Cases | 9 | | |
| Main Flow | Step | | Action |
| 1. Click on login after entering user id/password. | | 1. Display error message if invalid credentials otherwise proceed to the main page. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Remember Me** | |
| Related Requirements | 15 | |
| Goal In context | To allow users to save login info so that they do not need to sign in again | |
| Preconditions | The user has already signed up. | |
| Successful End Condition | Credentials successfully saved. | |
| Failed End Condition | Users will have to enter credentials again. | |
| Primary Actors | Software | |
| Secondary Actors | Registered User | |
| Trigger | The customer enters login details and clicks “login” | |
| Included Cases |  | |
| Main Flow | Step | Action |
| 1. Check the “Remember Me” box | 1. Login info saved |

|  |  |  |
| --- | --- | --- |
| Use case name | Delete Account | |
| Related Requirements | 23 | |
| Goal In Context | Allow the registered user to delete their account. | |
| Preconditions | The user must have logged in with an account that they want to delete. | |
| Successful End Condition | The account of the user is deleted. | |
| Failed End Condition | An alerting message is displayed, and the user is returned to the account settings screen. | |
| Primary Actors | Registered customer | |
| Secondary Actors | System | |
| Trigger | The user presses the delete account button. | |
| Included Cases |  | |
| Main Flow | Step | Action |
|  | 1 | The user presses the delete account button. |
|  | 2 | The user is requested to re-enter their account password. |
|  | 3 | Entering the correct password will delete their account and return the user to the login screen of the application. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | View/Change Account Settings | |
| Related Requirements |  | |
| Goal In context | The user can view and make changes to their saved details. | |
| Preconditions | Account must have been made. The user must be successfully logged into the account. | |
| Successful End Condition | The user will be able to view and change the name, phone number, email address, and delivery address. | |
| Failed End Condition | Changes are not saved. The new email address is invalid. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The user clicks on the “Account” button from the application menu. | |
| Included Cases | None | |
| Main Flow | Step | Action |
| 1 | The user clicks on the “Account” button. |
| 2 | The application displays the user account details |
|  | 3 | The user edits the details within the account settings. |
|  | 4 | The application updates the account details in the database. |
|  | 5 | A message saying “changes updated successfully” is displayed on the user screen. |

|  |  |  |
| --- | --- | --- |
| Use case name | Forgot Password | |
| Related Requirements | 24 | |
| Goal In Context | Allow the user to change the password of their account in case they have forgotten it. | |
| Preconditions | The user must have an existing account for which they want to change the password. | |
| Successful End Condition | The password of the user is changed | |
| Failed End Condition | An alerting message is displayed, and the user remains on the login screen. | |
| Primary Actors | Registered customer | |
| Secondary Actors | System | |
| Trigger | The user presses the forgot password button on the login screen of the application. | |
| Included Cases |  | |
| Main Flow | Step | Action |
|  | 1 | The user presses the forgot password button. |
|  | 2 | The user is redirected to the forgot password screen where they enter an email address to which a code is sent. |
|  | 3 | Entering the correct code will reset their account’s password and the user will be asked to enter a new password for their account. |
|  | 4 | Pressing the change password button after entering a new password will change the user’s password and return the user to the login screen. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | Log out | |
| Related Requirements | 22 | |
| Goal In context | The user can sign out from their account safely, without losing saved data. | |
| Preconditions | The account must have been signed in. | |
| Successful End Condition | The application will proceed to the log-in screen after logging out. | |
| Failed End Condition | The account is not logged out. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The user clicks on the “Account” button from the application menu. | |
| Included Cases | None | |
| Main Flow | Step | Action |
| 1 | The user clicks on the “Account” button. |
| 2 | The application displays the user account details. |
|  | 3 | The user clicks to log out settings. |
|  | 4 | Message displayed, “Signed out”. |

**4.2 View Items**

**4.2.1 Description and Priority:**

This system feature is of utmost importance and priority as it deals with how the items are going to be displayed for the user. And how the application deals with user interface and experience with the help of augmented reality.

**4.2.2 Stimulus and Response Sequences:**

*Start Camera:* This feature will allow the application to initiate procedures for augmented reality. If not initiated correctly, the application will not be able to access the camera and thus, not recognize the environment for the marker in the next step. The customer clicks on any item to view additional details. The application transfers to a new page with the camera on. If for some reason the camera is not accessible, the application displays an error message.

*Tracking Marker:* This feature aims to acknowledge the surrounding environment to trigger the marker. This AR feature is used to recognize and track smaller arbitrary objects, superimposing digital content to produce augmented reality experiences. Extract regular camera frames. Calculates the relative pose of the camera to recognize markers.

*Reading Marker:* A decent marker is effectively and dependably discernible under all conditions. Contrasts in brightness are more distinguished than contrasts in color utilizing machine vision strategies. This is because of the programmed white equilibrium of the cameras: the colors register mistakenly, and an item might change its tone in the picture contingent upon what else is in the view, for instance. Moreover, the lighting changes the apparent colors of the items, and hence color recognition is difficult. Normally, the more difference in brightness the more effectively objects are recognized. In this sense, white and black markers are ideal. The camera is switched on. The application recognizes markers and proceeds with an augmented version of the bake.

*Search Items:* This feature shows a 3-d Image of the chosen product along with any customizations that will be shown to the user when pressing the AR button on the app. The user presses the AR button after selecting a product to view its 3d-Model. The system will extract data of the 3-d model from the database and display it to the user.

*View Items:* This feature allows a registered user to view all the available products. The user presses the purchase button after selecting a product. The system redirects the user to the payment section of the app.

*Browse Items:* A list of items in the selected category is displayed to the user. The user enters the name of the item in the search bar and presses the search button. The system searches for the item name in the database and displays the relevant details of the item on the screen. If no item is found, display an error message.

*Customize Order Items:* The application will allow users to make changes to tier original order. For example, they could customize their order by changing the type of frosting or choose a different size. This is of high importance as it will improve the user’s experience. The user clicks on the different options of an item. The cart’s items will change according to the user’s preferences.

*Show 3D image:* This feature shows a 3-d Image of the chosen product along with any customizations that will be shown to the user when pressing the AR button on the app. The user presses the AR button after selecting a product to view its 3d-Model. The system will extract data of the 3-d model from the database and display it to the user.

**4.2.3 Functional Requirements:**

* Requirement 1- Show 3D bakery items in augmented reality
* Requirement 2 -Show details such as cost, designs, quantity, flavors, and sizes of the selected item.
* Requirement 3- The user can populate the items in mixed reality.
* Requirement 8- The app should be able to read markers.
* Requirement 9 -The user should be able to update the item size, flavor, color, topping (plus writing on cakes).
* Requirement 10 - The user should be able to search items directly.
* Requirement 11: The user should be able to browse through a list of items.
* Requirement 12- The application should have access to the camera.

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Start Camera** | |
| Related Requirements | 12 | |
| Goal In context | Access the mobile’s camera to start the AR experience. | |
| Preconditions | The user has permitted the application to access the camera. | |
| Successful End Condition | The application opens the camera on the screen and displays the message, “Point camera in one direction”. | |
| Failed End Condition | The application displays the message, “Unable to access the camera, change device settings” | |
| Primary Actors | Registered customer | |
| Secondary Actors | None | |
| Trigger | The Customer clicks the “Start AR” button on the window of the selected bakery item. | |
| Included Cases | Tracking Marker | |
| Main Flow | Step | Action |
|  | The Customer clicks the “Start AR” button on the window of the selected bakery item. |
| 2. | The application can access the camera. The correct proportion of screen and expected orientation. |
| Use Case Name | **Tracking Marker** | |
| Related Requirements | 25 | |
| Goal In context | The marker will provide accurate tracking using a visual marker or with a photo of real planar objects in-camera. | |
| Preconditions | The camera view has been initiated. | |
| Successful End Condition | Augmentation is initiated as the marker is recognized. | |
| Failed End Condition | Deformed marker, image not recognized. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The user will align the mobile to a physical marker. | |
| Included Cases |  | |
| Main Flow | Step | Action |
|  | A marker is recognized. |
|  | Camera frames are extracted. Calculates the six degrees of freedom positions including 3D size and location. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Reading Marker** | |
| Related Requirements | 8 | |
| Goal In context | Read the marker and retrieve the corresponding 3D image from the database. | |
| Preconditions | The app has a tracked marker. | |
| Successful End Condition | Marker is read and the corresponding 3D image is found in the database | |
| Failed End Condition | No marker or 3D image is found in the database for the read marker. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The customer clicks on the “Start Camera” button. | |
| Included Cases |  | |
| Main Flow | Step | Process |
|  | Poor image processing, line detection, and border formatting, and corners of the marker are detected. |
|  | Immediate removal of non-markers and immediate testing for the approval of potential markers. |
|  | Using data to decode markers to match the pre-installed template. |
|  | Accurate iterations based on estimation of the pose, to calculate real marker pose. |
|  | App responds by displaying augmented versions of bakery items. |
| Use case name | Show 3D Image | |
| Related Requirements | 1 | |
| Goal In Context | Display to the user a 3D Image of the selected item. | |
| Preconditions | The user must select an item that has to be shown as a 3D image. The marker for the item must have been successfully read. | |
| Successful End Condition | A 3D image of the selected item is displayed in Augmented Reality to the user. | |
| Failed End Condition | An alerting message is shown that the 3D image couldn’t be displayed. The user is returned to the item page.. | |
| Primary Actors | Registered customer | |
| Secondary Actors | None | |
| Trigger | The marker for the item is successfully read. | |
| Included Cases | None | |
| Main Flow | Step | Action |
|  | 1 | The system retrieves data of the product to show as a 3D model to the user from the database. |
|  | **2** | The 3D model is displayed in augmented reality. |

|  |  |  |
| --- | --- | --- |
| Use case name | View Items | |
| Related Requirements | 11, 12 | |
| Goal In Context | Display the available bakery items to the user. | |
| Preconditions | Successful user sign-in. | |
| Successful End Condition | The user is shown the selected available products that can be purchased. | |
| Failed End Condition | An alerting message is shown saying that the items couldn’t be displayed. The user is returned to the item page. | |
| Primary Actors | Registered customer | |
| Secondary Actors | None | |
| Trigger | The user presses the view items button to see available items. | |
| Included Cases |  | |
| Main Flow | Step | Action |
|  | 1 | The user presses the view items button. |
|  | 2 | Available items are then shown to the user. |

|  |  |  |
| --- | --- | --- |
| User case name | Search Items | |
| Related Requirements | 10 | |
| Goal in Context | The searched item is displayed to the user | |
| Preconditions | The Registered Customer has successfully logged in | |
| Successful End Condition | The searched item is found and displayed | |
| Failed End Condition | The search item could not be found | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The Registered Customer enters es the name of the item in the search bar and presses the search button | |
| Included Cases |  | |
| Main flow | Step | Action |
|  | 1. | The Registered Customer types the name of the item in the search bar and presses the search button |
|  | 2. | The application runs a query to find the item in the database |
|  | 3. | The searched item is found |
|  | 4. | The details of the item are displayed to The Registered Customer types the name of the item in the search bar and press the search button |

|  |  |  |
| --- | --- | --- |
| User case name | Browse Items | |
| Related Requirements | 11 | |
| Goal in Context | A-List of items in the selected category is displayed to the user | |
| Preconditions | The Registered Customer has successfully logged in | |
| Successful End Condition | All items in the selected category are displayed | |
| Failed End Condition | No item could be found in the selected category | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The Registered Customer selects a category from the menu for the items to be displayed | |
| Included Cases |  | |
| Main flow | Step | Action |
|  | 1. | The Registered Customer selects a category from the menu for the items to be displayed |
|  | 2. | The application runs a query to find the items in the database |
|  | 3. | The items are found |
|  | 4. | The items are displayed to the registered customer |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Customize Order Items** | |
| Related Requirements | 9 | |
| Goal In context | The user can change items and customize their shape, color, and other features. | |
| Preconditions | The cart should have had items added. | |
| Successful End Condition | The cart’s items will change according to the user’s preferences. | |
| Failed End Condition | The application fails to customize the items and will proceed to checkout with the default items. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None | |
| Trigger | The user clicks on the different options of an item. | |
| Included Cases | None | |
| Main Flow | Step | Action |
| 1 | Through the AR application, the user can view different options. |
| 2 | The user makes their desired changes to the items. |
|  | 3 | The cart is updated with customized items. |
|  |  |  |
|  |  |  |

### 4.3 System Feature: Order Items

4.3.1 Description and Priority

Order Items is a feature that will allow users to finalize the items they wish to be delivered. It will allow users to view and update their carts, as well as provide them with delivery and total costs and estimated delivery time. This feature will also incorporate payment methods that the user will use.

4.3.2 Stimulus/Response Sequences

*Make Purchase:* The user presses the purchase button after selecting a product. The system redirects the user to the payment section of the app.

*Checkout:* The user selects the “Continue to Checkout” option andconfirms the items selected in their cart. The user then selects his mode of payment and confirms their payment. The delivery address is also confirmed. The user is redirected to their order summary that contains the list of the ordered items with their price, the total cost, the delivery address, and the estimated time for the delivery.

*View/Update Cart:* To view the cart the user will click on the view cart. The user gets to view all the items added to their cart. To edit their cart the user selects items in their cart. The user will make changes to the items and the system calculates the new total cost.

*Calculate Delivery charges*: The user will click the checkout button. The system responds by calling a function that takes the distance between the shop and the address given by the user as parameters. The delivery charges are calculated and displayed to the user.

*Calculate Delivery Time:* The user will click the checkout button. The system responds by calling a function that takes the distance between the shop and the address given by the user as parameters. The estimated delivery time is calculated and displayed to the user.

*Calculate Total Cost:* The user clicks the checkout button. The system responds by calling a function that takes the price of each item as a parameter and calculates the total amount payable. The total cost is then displayed to the user.

*Payment: Customer checkouts:* Customers get the option to accommodate the payment either by credit card or by cash on delivery.

*Payment by credit card:* Customer selects the payment through credit card option and enters the number. The system asks the credit payment service to check the validity of the number and if valid, do the transaction. If invalid display an error message.

*Payment by COD:* Customer selects the payment cash on delivery option. Confirms the order with payment pending in the database.

4.3.3 Functional Requirements

REQ 4: The app should calculate the total cost.

REQ 5: The app should calculate the delivery charges.

REQ-6: The app should calculate the delivery time.

REQ 7: The user should be able to order items from the app.

REQ 14: The user can view and update the cart.

REQ-16: The user can view and update the cart.

REQ-17: The user can pay via credit card.

REQ-18: The user can pay via COD.

REQ-19: The app will update the payment information in the database.

|  |  |  |
| --- | --- | --- |
| Use case name | Make Purchase | |
| Related Requirements | 7 | |
| Goal In Context | Allow the user to make an order of the selected product. | |
| Preconditions | The user must have selected a product to purchase. | |
| Successful End Condition | The user is sent to the payment screen of the app. | |
| Failed End Condition | An alerting message is displayed and the user is returned to the product description screen. | |
| Primary Actors | Registered customer | |
| Secondary Actors | System | |
| Trigger | The user presses the purchase button. | |
| Included Cases | Payment | |
| Main Flow | Step | Action |
|  | 1 | The user selects the purchase item button. |
|  | 2 | The user is directed to the payment section of the app. |

|  |  |  |
| --- | --- | --- |
| Use case name | | Checkout |
| Related requirements | | 4,6,7,16,17,18,19 |
| Goal in context | | The user has to confirm his order, payment, and delivery address. |
| Preconditions | | The user has added the items they wish to order in the shopping cart. |
| Successful end condition | | The user successfully confirms their order and a summary of their order is shown. |
| Failed end condition | | The item, for which the order is placed, is not available.  There is an error in the process of payment.  Some of the necessary information required is not given by the user. |
| Primary actors | | Registered Customer |
| Secondary actors | | None |
| Trigger | | The customer selects the “Continue to Checkout” option |
| Included cases | | Customer authentication, view shopping cart, payment. |
| Main flow | Step | Action |
|  | 1 | The user confirms the listed items in the shopping cart. |
|  | 2 | The mode of payment is selected, whether it is Cash on Delivery or through a Credit Card. |
|  | 3 | The delivery address is confirmed. |
|  | 4 | The user then confirms the order from the checkout page. |
|  | 5 | A complete summary of the items, the total cost, and the address is presented. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | View/Update Cart | |
| Related Requirements | 4,7,16 | |
| Goal In context | To display items in the cart and update them if needed | |
| Preconditions | The user has already signed in. | |
| Successful End Condition | Items viewed or updated successfully | |
| Failed End Condition | Cannot view or update cart | |
| Primary Actors | Software | |
| Secondary Actors | Registered User | |
| Trigger | The customer clicks on the “view/update cart” button | |
| Included Cases |  | |
| Main Flow | Step | Action |
| 1. Click the “View/Update cart” button | 1. Opens page where user can view all items in their cart |
| 1. Edit each item individually | 2. Calculates new total |

|  |  |  |
| --- | --- | --- |
| User case name | Calculate Delivery Charges | |
| Related Requirements | 5 | |
| Goal in Context | Calculate and display transportation charges from shop to delivery address. | |
| Pre-condition | The Registered Customer has added their delivery address | |
| Successful End Condition | Calculated delivery charges are displayed. | |
| Failed End Condition | Address added was incorrect, too far for delivery, or not added. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None. | |
| Trigger | The Registered Customer clicks on the "checkout” button. | |
| Included Cases |  | |
| Main flow | Step | Action |
|  | 1. | The Registered customer adds their address and clicks the checkout button |
|  | 2. | The application calls a function, takes distance from shop to address as a parameter, and calculates the cost for delivery. |
|  | 3. | The delivery cost is shown to the user. |

|  |  |  |
| --- | --- | --- |
| User case name | Calculate Delivery Time | |
| Related Requirements | 6 | |
| Goal in Context | Calculate and display estimated transportation time from shop to delivery address. | |
| Pre-condition | The Registered Customer has added their delivery address | |
| Successful End Condition | Estimated delivery time is displayed. | |
| Failed End Condition | Address added was incorrect, too far for delivery, or not added. | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None. | |
| Trigger | The Registered Customer clicks on the "checkout" button. | |
| Included Cases |  | |
| Main flow | Step | Action |
|  | 1. | The Registered customer adds their address and clicks the checkout button |
|  | 2. | The application calls a function, takes distance from shop to address as a parameter along with a predefined constant, and calculates the estimated time for delivery. |
|  | 3. | The estimated delivery time is shown to the user. |

|  |  |  |
| --- | --- | --- |
| User case name | Calculate Total | |
| Related Requirements | 4,5 | |
| Goal in Context | Calculate and display the total cost of items. | |
| Pre-condition | The Registered Customer has added items to the cart | |
| Successful End Condition | The total cost of all items is displayed | |
| Failed End | No items were added to the cart | |
| Primary Actors | Registered Customer | |
| Secondary Actors | None. | |
| Trigger | The Registered Customer clicks on the "checkout" button. | |
| Included Cases |  | |
| Main flow | Step | Action |
|  | 1. | The Registered customer adds items to their cart and clicks the accommodate the system, the checkout" button |
|  | 2. | The application calls a function that sums all the prices of items in the cart and returns the total. |
|  | 3. | The total cost is shown to the user. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Payment** | |
| Related Requirements | 17, 18 | |
| Goal In context | Selecting a payment option | |
| Preconditions | There must exist an item in the shopping cart. | |
| Successful End Condition | * The user successfully checks out and goes to the payment section. * The user has the option to select the mode of payment. | |
| Failed End Condition | An alerting message that the cart is empty | |
| Primary Actors | User | |
| Secondary Actors | System. | |
| Trigger | The user checks out. | |
| Included Cases | None. | |
| Main Flow | Step | Action |
| 1 | User checkout. |
| 2 | A bill appears on the screen showing the order summary and the total cost. |
|  | 3 | The system redirects the user to the payment section. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Payment by Credit Card** | |
| Related Requirements | 17, 19 | |
| Goal In context | Bill is paid through a credit card. | |
| Preconditions | There must exist an item in the shopping cart.  The user’s credit card number must be valid. | |
| Successful End Condition | * A message that the order has been placed successfully, the estimated delivery time, and the summary of the order placed (an email sent to the user containing this information) * Updating the database that the payment is done. | |
| Failed End Condition | * An alerting message that the payment is unsuccessful, or the credit card number is invalid. * Resetting the text area asking for the credit card number again. | |
| Primary Actors | User, Credit Payment Service | |
| Secondary Actors | System | |
| Trigger | Customer selects the mode of payment through a credit card then enters the number. | |
| Included Cases | Payment. | |
| Main Flow | Step | Action |
| 1 | The user selects the mode of payment by credit card |
| 2 | The user enters the credit card number or automatically enters it if used earlier. |
|  | 3 | The validity of the number is checked via Credit payment service. |
|  | 4 | Completion of Transaction and a confirmation message. |
|  | 5 | A summary of the order detail, estimated delivery time are emailed to the user. |

|  |  |  |
| --- | --- | --- |
| Use Case Name | **Payment By COD** | |
| Related Requirements | 18, 19 | |
| Goal In context | An order confirmation with pending payment. | |
| Preconditions | There must exist an item in the shopping cart. | |
| Successful End Condition | * A message that the order has been placed successfully, the estimated delivery time, the summary of the order placed, and the total cost (an email sent to the user containing this information) * Updating the database that the payment is pending. | |
| Failed End Condition | None | |
| Primary Actors | User | |
| Secondary Actors | None | |
| Trigger | Customer selects the mode of payment by cash on delivery. | |
| Included Cases | Payment. | |
| Main Flow | Step | Action |
| 1 | The user selects the mode of payment by cash on delivery. |
| 2 | The validity of the user’s address and phone number is checked. |
|  | 3 | A confirmation message that the order has been placed with the total amount. |
|  | 4 | A summary of the order details estimated delivery time, and the bill is emailed to the user. |

# Other Nonfunctional Requirements

* Customers shall be able to scroll through the menu swiftly, without lag.
* The server shall be able to accommodate an indefinite amount of customers at the same time.
* The server shall be able to process an indefinite amount of orders at the same time.
* There shall be a minimum lag in calculating cost and estimating delivery time.
* There shall be minimum lag when the camera is operational.
* Items in augmented reality must be displayed instantly on the camera screen.
* There should be no delay in placing an item when the location of markers is changed in augmented reality.

## Safety Requirements

* The system shall be able to keep a record of orders placed by individual Registered customers.
* The system shall have a recovery response in case of a crash/failure.
* The system shall be able to keep a record of customer details such as login credentials, contact numbers, addresses, etc.
* The system shall be able to update customer details in the database when prompted.
* A copy of a customer's order shall be sent to the customer's email address.

## Security Requirements

* All data shall be securely stored in a database.
* Users shall be able to edit their account information only.
* Users’ details such as credit card information shall be kept confidential.
* The application shall be available for all users to use but the source code is to stay hidden.

## Software Quality Attributes

* The login feature shall prevent unauthorized access to the application.
* Products shall be delivered correctly to the marked destination given by the user.
* The user shall easily be able to download the application and install it on their device.
* The application shall be easy to use for all users whether they are new or infrequent.

## Business Rules

* Delivery charges shall be Rs 50 within a 10 km radius.
* Delivery charges for distances above 10 km shall be Rs 10 per km.
* If an item is unavailable, it shall be marked ‘out of stock’ on the application.
* Users should provide accurate information for better service.

# Other Requirements

* All expected and unanticipated errors shall be handled in such a way that long downtime periods and data loss are avoided.
* The application shall handle the sudden spikes of increased traffic without extra effort.
* A modern database system should be used to increase the efficiency of the system.

Appendix A: Glossary

|  |  |
| --- | --- |
| **Term** | **Definition** |
| SRS | Software Requirement Specification document. |
| Augmented Reality | A technology that superimposes a computer-generated image on a user’s view of the real world. |
| IEEE | Institute of Electrical and Electronics Engineers (World largest technical professional organization). |
| bug | An error or fault in the application. |
| user | Someone who registers in the application. |
| Stakeholder | Any person who interacts with the system and is not a developer. |
| Database | Structure set of data |
| markers | Visual cues trigger the display of virtual information. |
| 3D image | A 3-dimensional image. |
| COD | Cash on delivery. |

Appendix C: To Be Determined List

* We will include an option to pay through PayPal.
* Options to sign up through Google and Facebook accounts will also be added.
* To enter an accurate address, we will add the google maps services to the app so that the customers could pinpoint the exact location.
* We are intending to utilize LiDAR (Light Detection and Ranging) innovation to make a 3D guide of environmental factors which will give a feeling of depth to the bakery items rather than them looking like a picture.
* We also have planned to include occlusion, in which any physical object situated before the bakery item will block the virtual 3D image to give a feeling of the real world.