SOFTWARE REQUIREMENTS SPECIFICATION

AMAZON GO

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Table of Contents

List of Figures

List of Tables

1. Introduction

This documents is a Systems Requirements Specification for Amazon Go system, powered by Amazon.

1.1 Purpose

The purpose of this project is to make the customers' experience of shopping efficient. With the world's most advanced shopping technology, Just Walk Out technology, customers will be able to shop with no lines and no checkout. In order to accomplish this, customers simply use the Amazon Go app, scan the QR Code unique to their account, shop and leave. The Amazon Go system is developed so that the experience of the customers are smooth and enjoyable.

1.2 Scope

- System will have a user interface where the users can login to their existing accounts or create a new account. After login, users will specify their personal information and credit cards. Using the user interface, users will be able to display their QR Code, discover meals, see their receipts, search for the Amazon Go stores near by and get help/contact/sign out.
- System will have an interface for the IT staff. IT staff will be able to view system logs. The IT staff will display the system reports, errors and will be notified in terms of emergency.
- System will keep the user information, unique QR Code, card information, receipt address and past receipts for each user via database interface. After scanning the QR Code, system let the user and its dependants pass the gate of the store.
- System will keep track of the user in the store and the products s/he takes via Sensor Fusion. When the user leaves the store, system will charge the account and send the receipt via email.
- The system will not provide online shopping.

1.3 System Overview

This section defines the system's interaction with other products.

1.3.1 System Perspective

The Amazon Go system uses Gate system to scan the user's key and open the turnstile by giving a permission. Sensor Fusion sytem determines whether a user or its dependants is taking a product inside the store and add the product to the user's virtual cart in the application. AI system is used to analyze users' data, optimize the profit by giving recommendations on the app. The Amazon Go application has different interfaces and is used mostly by the users. They can sign up, see their virtual cart, personal information and recieve their receipts after shopping. Team of associates is the working staff in the store with

responsibilities of helping the customers and restocking the shelves. IT Staff helps the system function without any errors.

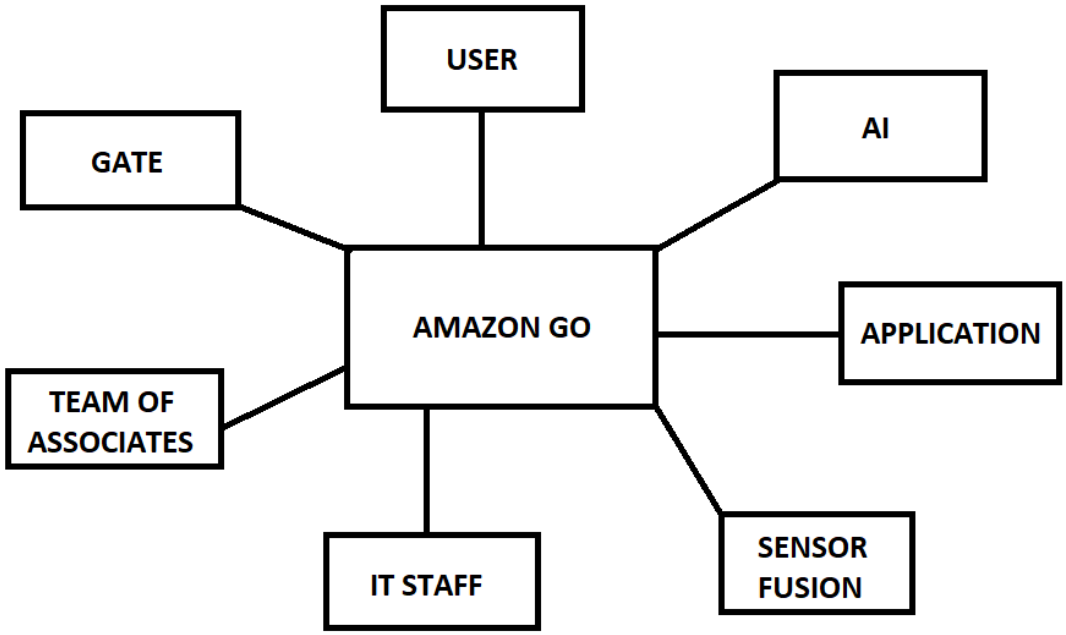

Figure 1: Context Diagram

1.3.1.1 System Interfaces

1.3.1.2 User Interfaces

1.3.1.3 Hardware Interfaces

1.3.1.4 Software Interfaces

1.3.1.5 Communications Interfaces

1.3.1.6 Memory Constraints

1.3.1.7 Operations

1.3.2 System Functions

Functionalities of Amazon Go is displayed and summarized in the following table. Their detailed versions and description tables can be found in the 3.2 Functions section.

Function	**Summary**
Take/drop item	Virrtual cart of the user is updated if a product is taken or dropped.

Get information	Users get information about the Amazon Go system in the user interface.
Send receipt	After the user leaves the store, receipt of the shop is sent to the user and notifies her.
Scan QR code	To enter the store, QR code that is uniquely identify the each customer is scanned at the gate.
Open turnstile	After receiving the confirmation of the permission from the system, gate system open the turnstile in front of the user.
Restock shelves	Workers at the team of associates restock the empty shelves.
Ask Questions	Users ask questions about the system and application to the team of association.
View system logs	IT Staff views the system related error logs in the IT Staff interface.
SKU optimization	Variety of products arranged by the AI to meet the product requests.
Product Location Optimization	Location of products arranged by AI to improve them and their sales rates.

1.3.3 User Characteristics

1.3.4 Limitations

1.4 Definitions

Term	Definition
AI	Artificial Intelligence
User	People who have signed up
IT Staff	Staff that are working in the Information Technology department

Sensor Fusion	System for combining different data streams from cameras and weight sensors to get more accurate data
DBMS	Database Manament System
SKU	Stock Keeping Unit

2. References

3. Specific Requirements

3.1 External Interfaces

3.2 Functions

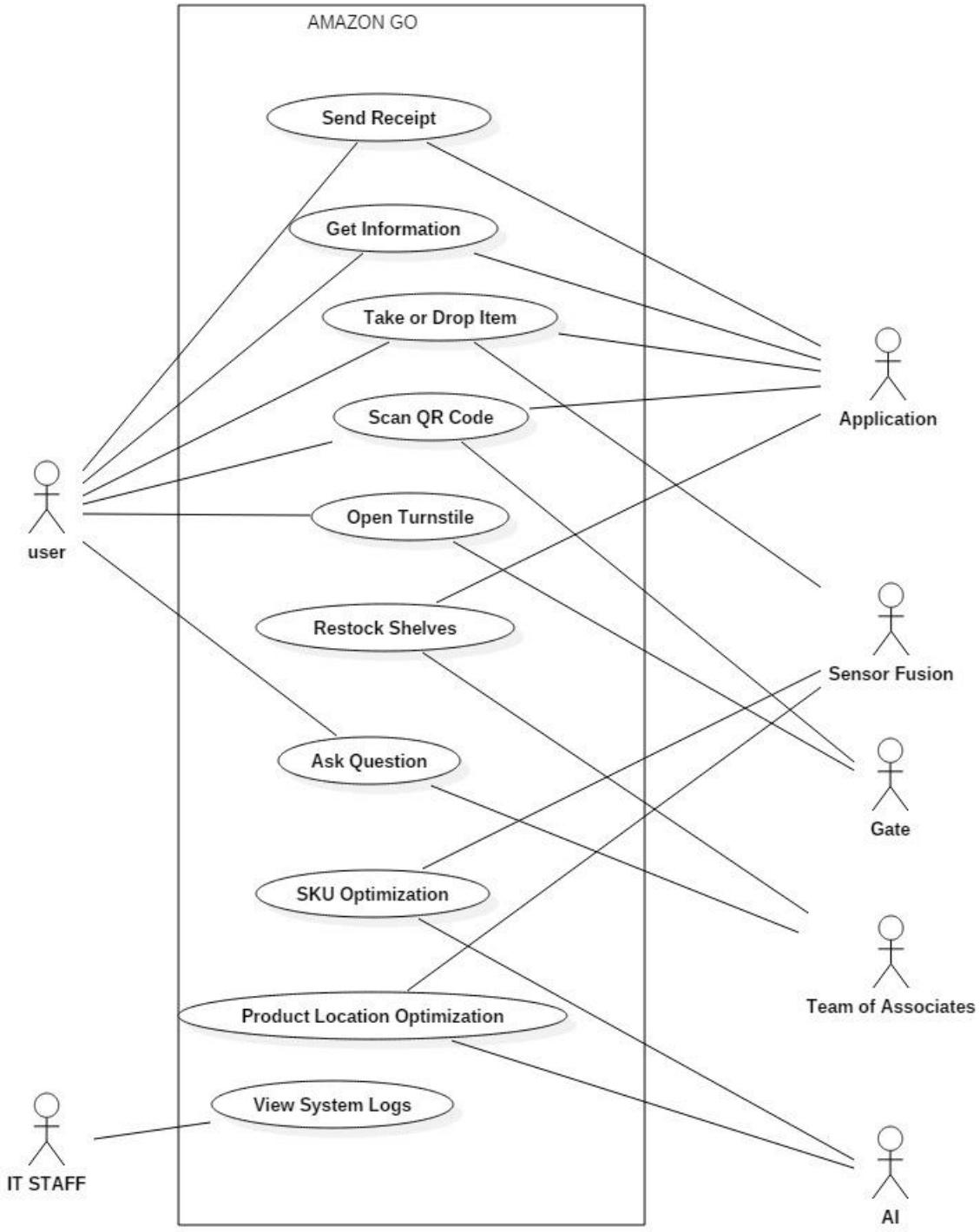

Figure 2: Use-case diagram

Use case name	Take/drop item
Actors	User, Application, Sensor fusion
Description	User takes/drops an product from the shelves, sensor fusion detects it and the product is added to/removed from the virtual cart of the user
Data	Weight sensor data, camera data, product id, user data
Preconditions	User should have an associated account
Stimulus	Taking/dropping the product from the shelves
Basic Flow	Step 1 - After taking/dropping the product, process the weight sensor and camera data in sensor fusion system Step 2 - Send the data from Sensor Fusion to Application Step 3 - Product is added to/removed from the user's virtual cart and displayed in the user interface
Alternative Flow	-
Exception Flow	The user hands over the product to someone but the product will stay on the user's cart or user puts the product to a different shelf
Post Conditions	Taken/dropped product is recorded in the DBMS and total cost is updated

Use case name	Send receipt
Actors	User, Application
Description	User receives the receipt via email after leaving the store
Data	User's email address, user's receipt address, products in the virtual cart, total cost
Preconditions	User should leave the store with product(s)
Stimulus	User walks out of the store
Basic Flow	Step 1 – Information that user left the shop comes to the application Step 2 – The data is collected from DBMS Step 3 – Receipt is displayed in the application and added to the database
Alternative Flow	-
Exception Flow	If the DBMS connection is lost, the IT staff gets a notification
Post Conditions	Application notifies the user and charges the card

Use case name	Scan QR code

Actors	User, Application, Gate
Description	User gets into the store by scanning the QR code which is displayed in the application at the gate
Data	QR Code, user data
Preconditions	User should have an appropriate QR code
Stimulus	User scans the QR Code with the scanner
Basic Flow	Step 1 – Scan QR Code Step 2 – Check if the QR code is in the database
Alternative Flow	-
Exception Flow	The QR Code may not be readable because of the obstacles in front of the screen (such as fingers) or the angles
Post Conditions	Send or do not send a permission to the system

Use case name	Open turnstile
Actors	User, Gate
Description	Open turnstile in front of the store if there is a permission
Data	Permission
Preconditions	Permission need to be given
Stimulus	Confirmation of the permission by the system
Basic Flow	Step 1 – Open the gate
Alternative Flow	-
Exception Flow	Permission is not given or the gate is broken and do not open
Post Conditions	User enters the store

Actors	Get information
Description	User gets information about the system and application in user interface
Data	Scripts of questions and answers
Preconditions	User should have a signed up account and the application
Stimulus	User clicks the More > Help button

Basic Flow	Step 1 – Display the subtitles in the user interface Step 2 – User clicks the one of subtitles except Contact Us Step 3 – Display the scripts of questions and answers related to that subtitle
Alternative Flow	-
Exception Flow	Scripts data can not be provided
Post Conditions	User reads the scripts

Use case name	Restock Shelves
Actors	Team of associates, Sensor fusion, AI
Description	If any shelf is empty , it is detected by cameras and sensors then this shelf is refilled with new products
Data	Weight sensors data, cameras data, product id, shelf location
Preconditions	At least one empty shelf, available worker to refill shelves
Stimulus	At least a shelf became empty
Basic Flow	Step 1- Empty shelf is notified by fusion system Step 2- Fusion system send an a warning to system Step 3- System detect necessary product and location of shelve Step 4- System controls stocks for this product Step 5- System send an order to team of associates for refill shelve with necessary product Step 6- Team of associated refill shelve with necessary product Step 7- Sensor fusion detect shelve is refilled Step 8- System marks the warning as handled
Alternative Flow	Step 4-If product is not in stock, system gives an order for this product and wait until it is available in stock again
Exception Flow	If product no longer available anywhere, system notifies AI
Post Conditions	Shelf is refilled by products

Use case name	SKU Optimization
Actors	Sensor fusion, AI, Team of associates
Description	AI keeps data that is sent from sensors and analyze it to improve product variety according to product demand

Data	Camera data, product id
Preconditions	System sends a receipt to improve efficiency of product variety
Stimulus	Product variety is not appropriate for customers
Basic Flow	Step 1- System sends a request to improve product variety Step 2-AI analyzes data which is sent from sensor fusuion system Step 3-AI detects necessary and unnecessary products Step 4-AI sends this data to system Step 5-System rearrangse product variety list
Alternative Flow	Step 5-If there is no change in product variety, system do not reaarange product variety
Exception Flow	-
Post Conditions	Products are arranged according to new list

Use case name	Product Location Optimization
Actors	Sensor fusion, AI, Team of associates
Description	AI keeps data sent from sensors and analyze it to improve products' locations
Data	Camera data, product id
Preconditions	System send an receipt improve product location
Stimulus	Product location is not appropriate for customers
Basic Flow	Step 1- System sends a request to improve product locations Step 2-AI analyzes data which sent from fusuion systems Step 3-AI detects appropriate locations for each item Step 4-AI sends this data to system Step 5-System rearranges products locations according to this data
Alternative Flow	Step 5-If there is no change in product locations, system do not reaarange them
Exception Flow	-
Post Conditions	Products are arranged according to new data

Use case name	View System Logs
Actors	IT staff

Description	IT staff can list the system logs of Amazon Go and logs can be arranged by their date of formation and where the events take place. These logs include technical details of Amazon Go application.
Data	System logs
Preconditions	IT staff must be assigned and authorized to read system logs.
Stimulus	IT staff send a request to system for reaching system logs.
Basic Flow	Step 1-System logs request is sent to system. Step 2-System gives permission to IT staff. Step 3-Logs became visible in IT staff interface
Alternative Flow	-
Exception Flow	If connection or logs are lost, system notifies IT staff.
Post Conditions	System logs became visible on IT Staff's interface.

Use case name	Ask Question
Actors	User, Team of Associates
Description	Users can ask question to Team of Associates about the store, application, etc.
Data	-
Preconditions	At least one non-busy worker
Stimulus	-
Basic Flow	Step 1-User has a question Step 2-User finds an appropriate worker Step 3-User asks question to worker Step 4-Worker communicates with the user and answers the question
Alternative Flow	Step 3-If all workers are busy user waits someone to be avaliable
Exception Flow	If no worker is available in the store
Post Conditions	User's question is answered