Overview

This document describes an original and revolutionary process, and accompanying systems that improve the productivity of a retail store by substantially reducing the time that a customer needs to spend in the store in order to purchase goods. It achieves this by:

- Providing the customer with a shopping list that can be populated from products available in the store and automatically updated as the customer shops in the store.
- Using the existing customer store card to identify a customer,
- Allowing the customer to scan store items as they are added to their shopping basket,
- Displaying information about an item to the customer without purchasing the item,
- Informing the customer of special offers in the store,
- Allowing the customer to remove items from their basket prior to paying for them,
- Allowing the customer to bag items as they shop and prior to purchasing them,
- Removing the need for the customer to unload their shopping from a basket prior to leaving the store,
- Automatically taking customer payment by cash, payment card, direct debit or even billing the customer at a later date,
- Avoiding lines at the checkout,
- Recognizing items leaving the store that have not been paid for,
- Providing real-time assistance to the customer,
- And generally monitoring the customer's shopping experience while they are in the store.

All of the above improvements may be achieved by installing a simple app on readily available mobile devices and by making some minor software changes to existing store systems.

1.1 The Problem

Today's shopping experience is most inefficient and at times frustrating due to the store being unprepared for an excessive number of customers attempting to checkout at the same time. This deficiency is removed with several relatively inexpensive improvements to the customer shopping experience and to the checkout process, as used by stores today. The diagram below shows the activities perfumed by a customer as they shop in a typical large store today.

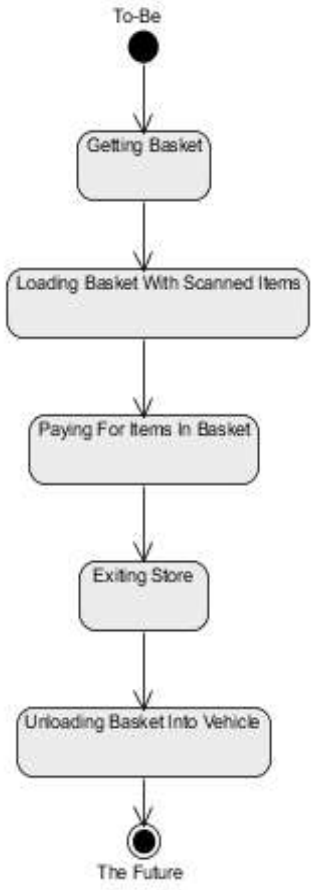
- The customer enters the store and grabs a basket (or shopping cart).
- The customer browses the store deciding what to buy based upon research, experience and information that is available to them in the store and on the item packaging.
- The customer enters a checkout line and waits for the checkout to come free, at which time they unload their basket (or cart) onto the scanning area.
- Items are scanned one by one and placed into the loading area, where they may be placed into bags.
- The customer pays for the scanned items.
- The customer loads the bagged and unbagged items back into the cart, or carries bagged items by hand.
- As the customer exits the store, tag detectors identify expensive items that have not had their tags removed.
- Lastly the customer unloads any items or bags from the cart into their vehicle.

Figure 1: Overview Of Today's Typical Shopping Experience

The more items that a customer purchases, the more loading and unloading that occurs and hence the more painful the shopping experience for the customer.

2 The Future Shopping Experience

A much more pleasant and efficient shopping experience, will keep the customer informed continuously of what they are buying, allow them to bag as they shop and to leave to store without waiting in line or unloading their shopping basket at any time before they reach their vehicle. The following diagram shows an overview of this experience.



- The customer enters the store and grabs a basket (or shopping cart).
- The customer is recognized as a valued shopper and starts scanning items and placing them into their basket (or their own bags.)
- The customer pays for the items in their basket. The checkout knows what items are in the customers' basket and verifies the payment amount against those items.
- The customer leaves the store.
- The customer loads their shopping into their vehicle.

Figure 2: Overview Of Tomorrow's Shopping Experience

The customer experiences no lines at the checkout; the customer can bag as they shop; the customer unloads their basket just once (after they have exited the store), and the customer is continuously informed with item, information, location, costs, and an itemized list of the contents of their basket, which may be automatically compared against a predefined shopping list.

2.1 How It Works

This new shopping system requires a software app that can be executed on a Wi-Fi enabled device and software to interface the app with an existing store computer system. The store provides hardware devices in the form of; a system server with Wi-Fi capabilities for communicating to the customer via a mobile device, an intelligent cashier system (which is able to send the results of a customer transaction to the server), a customer database, a product database, and optional item detection systems which can detect items leaving the store (an alternative or parallel process model uses staff to check items leaving leaving the store against an electronic customer receipt on a mobile device).

2.1.1 System Architecture

The following devices and systems are used by the future shopping experience.

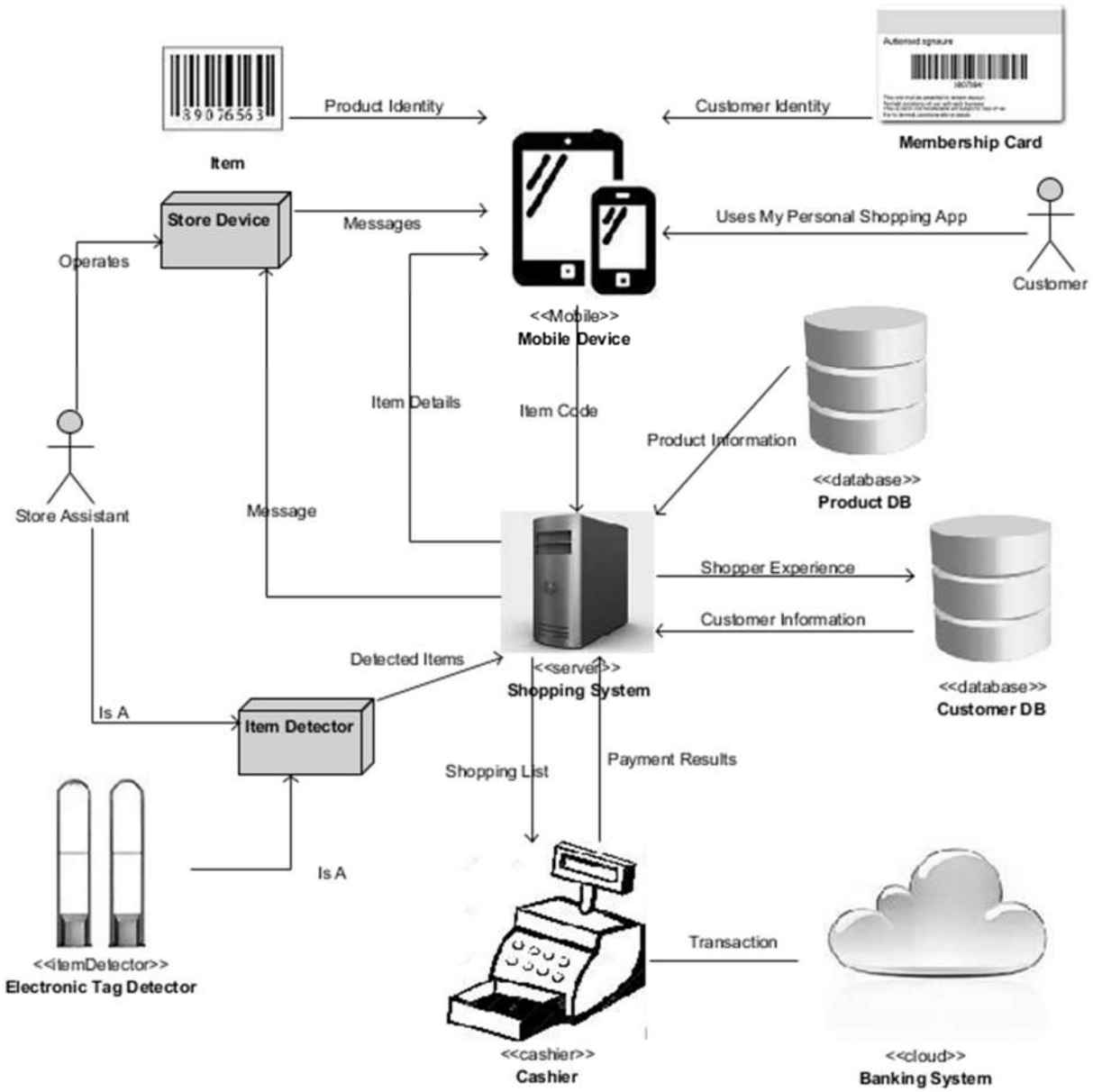


Figure 3: To-Be System Architecture

The customer has access to a smart mobile device with Wi-Fi capabilities and a camera. This mobile device will execute the Personal Shopping app which allows the device to communicate with the store shopping system. The mobile device is able to recognize a store item by scanning it with the device camera. The mobile device will allow a customer to login to the system as a shopper, when on the store premises, by scanning their membership card.

A store clerk has access to a smart mobile device or dedicated store system, which is able to communicate with both the customer's mobile device and the shopping system. The store device is capable of sending and receiving messages to either the shopping system or the customer

mobile device. It receives customer activity from the shopping system which allows the store assistant to monitor customer activity.

A database of customer profiles is accessed by the shopping system. Customer profiles are read and updated by the shopping system.

A database of products carried by the store is read by the shopping system.

The cashier system is able to inform the shopping system of payments made by customers and whether those payments were accepted. (No changes are envisioned in communication between the cashier system and the existing banking systems.)

An (optional) item detector will be able to identify items leaving the store and associate those items with the customer who has them in their possession. This system is used for preventing items from leaving the store that have not been paid for.

Additionally, the store assistant will be able to display the contents of a shopper's basket that have been paid for, and compare those items against those in the customer shopping basket.

2.1.2 The Future Customer Experience

The following diagram shows the customer experience as a result of the to-be process being applied to the to-be system architecture.

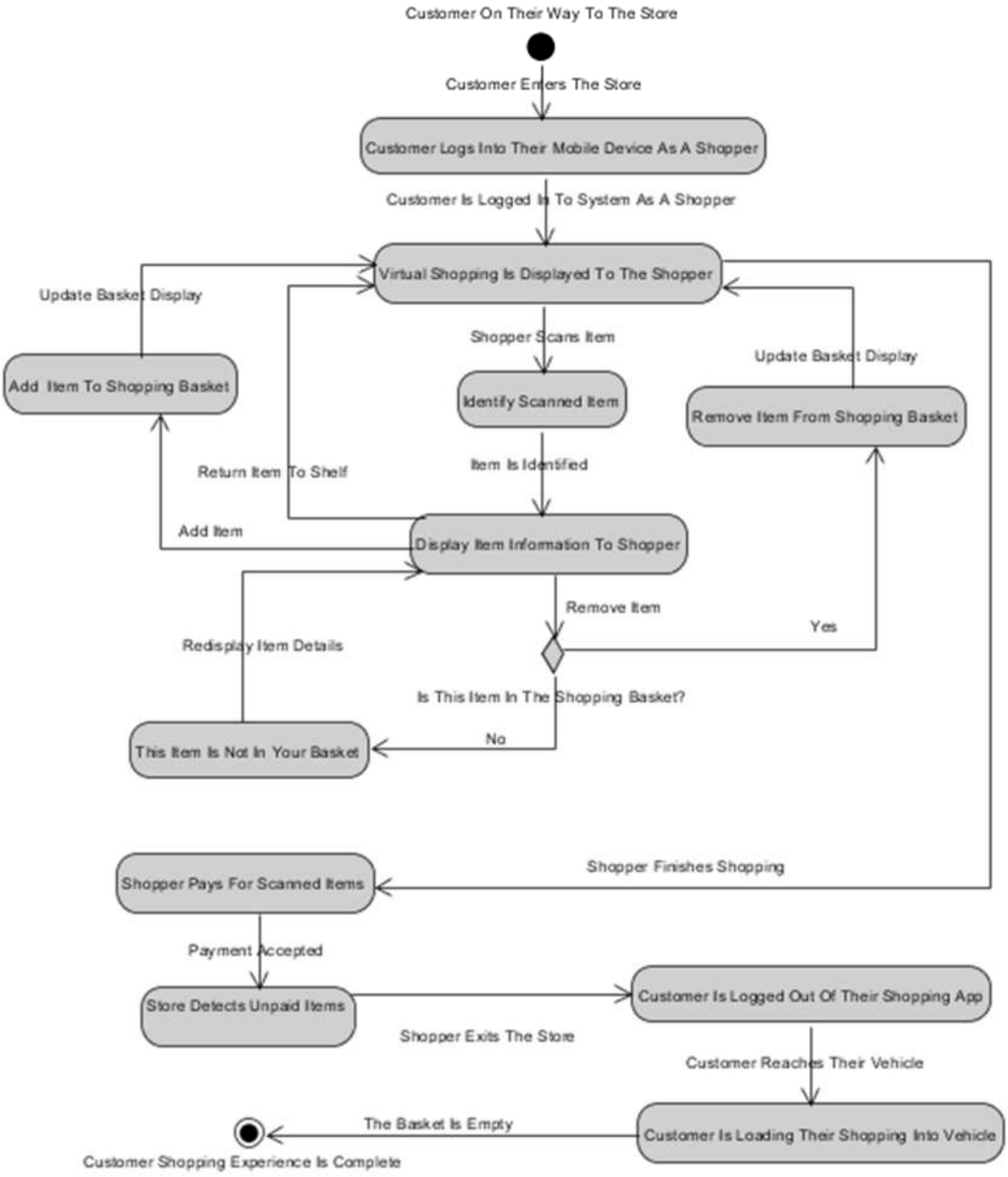


Figure 4: To-Be Shopping Experience

- Customer Logs Into Their Mobile Device As A Shopper - When the customer is within range of the store Wi-Fi, they login to their Personal Shopping app by scanning their preferred customer card and entering their password. The customer now becomes a shopper.
- Virtual Shopping Is Displayed To The Shopper - The shopper takes a basket or shopping cart, or may even use their own bags if they wish. The Personal Shopping app maintains selected items in a virtual shopping basket. The app displays an empty basket to the shopper.
- Identify Scanned Item – A customer may scan an item in the store at anytime (using their Personal Shopping app), whether or not they have connected to the system as a shopper.
- Display Item Information To Shopper – The Personal shopping app displays information about the product that was scanned. The shopper has 3 options; they may return the item to

the shelf, they may add the item to their virtual shopping basket, or they remove the item from their basket. Return item to the shelf does no action (note that this is the only action that is available to a customer who is not logged into the system as a shopper).

- Add Item To Shopping Basket – The shopper selects 'Add' and the item shows up in their virtual shopping basket.
- Remove Item From Shopping Basket – The shopper wants to remove this item from their shopping basket and return it to the store shelf. The app shows this item as removed from the virtual shopping basket.
- This Item Is Not In Your Basket – If an item selected for removal, has not been previously added to the shopper's basket they will be informed that the item cannot be removed and they will be displayed options to add it to their basket or return the item to the shelf.
- Shopper Pays For Scanned Items – At any time while the shopper is logged into the system they may elect to pay for the items in their basket. If paying by cash or card the shopper will need to access a cashier system, where they scan their membership card. The cashier receives an itemized list of items in their basket and performs the payment process (as with the self-checkout process today). If paying by account, the shopper may simply exit the store after receiving confirmation that payment has been accepted.
- Store Detects Unpaid Items- As the shopper leaves the store, items in their bags and shopping basket are compared to the items paid for in their virtual basket, in order to verify that no unpaid for items are leaving the store. (This activity uses a combination of store detectors to detect tagged items, and store workers to verify untagged items.)
- Customer Is Logged Out Of Their Shopping App – As the shopper leaves the store they are automatically logged out of the Personal Shopping app.
- Customer Is Loading Their Shopping Into Vehicle – The customer simply loads their shopping into their vehicle.

Their basket was never unloaded in the store. The customer never stood in line waiting for assistance. Assistance was provided to the customer by communicating with a store worker through their mobile device. The Shopping System tracked the customer's activity while they were in the store.

3 Summary

This paper describes the basic concepts for a mobile personal shopping app and changes to store systems.

It allows a registered customer to browse and shop within a retail store without waiting in line, searching for an assistant or unloading their shopping before leaving the store.

Additional functionality that is not described in this paper might include:

- Providing a store layout
- Automated assistance with locating and item.
- Management of a shopping list.
- Tracking the customer location while they are in the store.
- Providing features for use by a customer while they are away from the store.
- Shipping items to the customer from their mobile device.

The benefits to a retail store include:

- Identifying customer shopping habits and promoting items of interest to the customer.
- Ensuring that the customer does not forget an item on their shopping list before they leave the store.
- More space for selling products.
- Reduction in staffing hours.
- Less crowding at the checkouts.
- Less waste due to breakage during loading and unloading the cart.
- Promotion of special events in the store.
- And most importantly, happier customers.

A more detailed analysis of the features and functions described in this overview can be found in the series of papers entitled, ‘Analysis Of A Shopping Expedition’, by Leslie Munday.

Appendix A - Questions and Answers

- What if the customer has no smartphone or if their phone dies? – Have loaners at the store. The app works off of the customer account with the store and can be transferred to any mobile device even while shopping. Also provide charging stations for mobile devices.
- What if there are customers in the store without a membership card? – Make all customers go through a checkout. Those paying with their shopping card simply swipe the card and accept the checkout confirmation.
- How to distinguish between self-checkout and app checkout? – If customers are self-checking out (either with app or with checkout kiosk) they will go thru one line. All customers with a receipt go through a different exit.
- How to confirm shopping against the shopping basket contents upon exit? – Use scales to get a rough estimation of weight with basket. Use visual checking. Tag expensive items.