

# Ingenious Pushcart

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## ABSTRACT

In this paper we present an ingenious pushcart which is a revolutionary design to increase the functionality of the cart and to enhance the user experience. We conducted an end-user survey to assist the design of the trolley. Through which are explored preferable features to be incorporated, which will enormously save the time of the end-user. We describe the survey and its results in the design principles of the features that are to be supported and are integrated into the pushcart. The aim of the system is to support shopping in supermarkets'. Thus, the interactive cart guides the user for better product description than traditional trolley systems by exhibiting a more uniform behavior in terms of product sequence collection and makes it easier for shoppers to find the products and reduce the wait time.

**Keywords:** Smart cart, Barcode, Billing

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## I. INTRODUCTION

Shopping in the real world is more likely to involve the handling of real world objects and at the same time, technologies for enhancing the experience. The placement of the products is essential for rise in the sales of supermarkets and promoting such products on a cart screen raises concerns example what products should be shown on the display screen, when should these products be displayed, and where should certain products be displayed in the store for which we describe the design and evaluation of a prototype for enhancing the shopping experience in supermarkets.

Shopping in supermarkets is becoming an increasingly interactive and smart user experience. Certain concept stores and future stores have started using RFID tags to streamline supply chain as part of a check out free store concept. While other stores have integrated self-checkout points to speed up the paying process. The basic nature of shopping with a huge business potential makes it an interesting domain for innovating and incorporating IoT. Before going to shop, customers either create a written or a mental shopping list. A shopping list is used as an external memory aid, a tool for budgeting and a guide to plan the visit to the store. However, shopping lists are not rigid plans. In fact, customers purchase

two to three times more items than what they include on their list. Accordingly, retail stores also provide space for exploring alternatives and potentially relevant and interesting items.

## II. RELATED WORK

The system is composed of RFID, IR, Zigbee, RFID Tags, EEPROM integrated onto a microcontroller as the hardware subsystem while the software is composed of ZigBee interfaced with the server. IR receivers, IR signals are used to determine the position of the cart with the help of IR transmitters and this information is relayed to the main server using Zigbee. Using the above information all the product details in the vicinity of the cart are retrieved and sent to it. All the products are uniquely identified using RFID Tags. Once the product is selected on the cart, the RFID Tags enables the reader on the cart to identify the product and add its cost to the bill. In this fashion products may be added or deleted from the cart as required. The total bill is thus generated once the complete button is hit. [1]

Another project developed was based on Radio Frequency Identification (RFID) technology. Where, they proposed a

system for labelling every merchandize with a RFID tag. The concept was such that a mobile payment portal was to be integrated in the system to provide automatic checkout process. This would be beneficial as there would be more security to rely on and a better opportunity for the supermarkets to increase their sales. It also gave the supermarket a collection of personalized data for individual customers and also to attract them with better offers in the future. [2]

The Automated Shopping cart system integrates a trolley cart with 2 sets of barcode scanners fitted at two different checkpoints – the entry and exit points respectively. It enhances the user to himself scan the barcode of the products he intends to buy. Any wrong entries made by the user can be corrected by using a keypad that can change the functionality of the machine to add, remove the product and activate the barcode scanner at the other end. A wireless smart-device makes note of all the scanned products that a user adds in his cart while shopping. Each cart has an allotted number given and is linked with the Supermarket's backend database which contains details of the products such as Cost Price, Available Stock. The billing is done automatically in the smart device for their purchases which thereby significantly reduces the turnaround time of shopping and billing and the information is transmitted to the Shop's central Billing program. This is a method which uses its time efficiently and the unnecessary time wasted in long queues at billing counters in shopping marts can be avoided. Users can then make use of the counter to pack and pay their bill amount as they have an automated bill generated at the end of the shopping with a smart device. The tray in which the two barcode scanners are embedded is fitted with a lock and keys for which are with the people at the billing section. This allows users to take out all their products and place them into carry bags during the checkout process. [3]

### III. PROPOSED SYSTEM

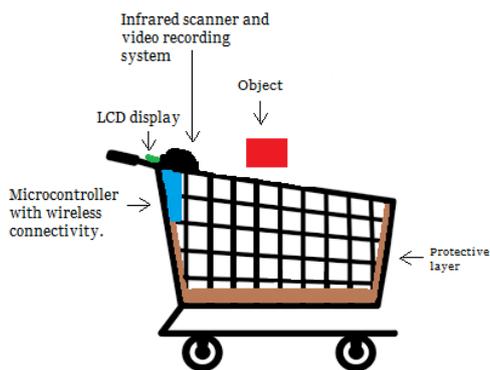


Fig 1. Proposed Pushcart System

The proposed system is composed of: IR scanner, smartcard, LCD display, microcontroller and a camera. The smartcard is used to maintain a record of the customer in the store inventory. Once the customer enters the store, he uses the IR reader to scan the barcode on the smartcard. This will create a reference of the user in the central repository of the store and link it to his previously stored shopping details. This will also enable us to device a recommendation system based on the particular user's shopping pattern.

The IR scanner is used again to read the barcode on the products. Once the barcode is detected, relevant information about the product is displayed on the LCD screen. After which the user has an option to add or delete the products into the shopping list. The same process is repeated until the user has purchased all his products. A security camera records the footage in real time and stores the footage in the central repository. Upon checkout a final barcode is generated which is scanned by the supermarket personnel. The payments have to be made accordingly.

### IV. CENTRALIZED BILLING SYSTEM

The figure shows the system of a Central Billing System. Since each cart is attached with a product identification device (PID), through Wi-Fi communication PID sends its information to the central billing system, there it calculates the net price for the purchased products. Each cart is associated with a customer number temporarily up to the time checkout is encountered.



Fig 2. Proposed Centralized Billing System

### V. BENEFITS

- Retailers get their customers in an organized and targeted manner.
- Customers will be benefited as their time is being saved.
- Hassle free shopping experience with easy to use system.
- Whole new self-check-out process is the plus point for their customer.
- Business scaling is done within practical vicinity.
- Recommendations help to increase user experience.
- Can be easily integrated with other platforms.

### VI. CHALLENGES

- An Admin application needs to be installed at every local shop.
- System is designed considering a personalised touch display as a user application.
- Cold start problem, as vast volume of data is not available at start.

## VII. FUTURE SCOPE

The design and implementation of this project has helped local businesses grow eventually. At the moment, the recommendation algorithms are not the issue, but the entire architecture of how we generate recommendations.

In this fast moving environment recommendation system should also match up with user. This system can be integrated with other platforms when required. The fast check-out mechanism will allow the users to have an uninterrupted experience. Also, security will be enhanced at the retail store.

## VIII. CONCLUSION

Our experience with Smart Shopping has indicated that there are several technical challenges to be met in deploying a pervasive retail system. First, technologies that capture information about interactions between physical objects are not yet mature enough for the consumer market as they are relatively costly. Even when such data becomes available the task of interpreting it is often as challenging as its registration, since no standardized classification scheme or appropriate taxonomy exists.

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