IntCart for Easy Shopping in Supermarkets using Raspberry Pi and RFID

Mr. K.Raj Thilak[1], Mr.W.Rajan Babu[2], Ms.J.Anupama[3], Ms.P.Pradeepa[4], Ms.K.Roshini[5], Ms.Swetha Ashok[6],

[1to 6]Department of Electrical and Electronics Engineering,Sri Eshwar College of Engineering,Coimbatore.

Abstract:
Int cart is an efficient method, because shopping is never considered to be an easy task rather than waiting in a billing counter which is a tedious task. Preparation of bill using barcode scanner by a cashier is time consuming hence using a RFID scanner in the cart itself that is interfaced with the processor enables the technology to ease the process. As the shopper adds more things it is detected by scanner module and price keeps increasing. If the customer doesn’t want any product added already, the price can be deducted. When the shopping is complete, shopper presses the button and all the prices are added and bill is communicated to the mobile phone. So, either online payment or cash payment can be made using the bill that has been generated. Hence, this system is suitable for use in places like supermarket where it can help in reducing manpower and also a better shopping experience for its customers.

Keywords —RFID, Intelligent shopping,Internet of things, Raspberry Pi, IR sensor, Python.

A. INTRODUCTION
The word intelligent is trending lately in the field of IoT. Every object all over the world is being made smart so as to make us live comfortable. With the increase in technology, food items are available at the door steps whenever needed. But the experience of going to a mall and shopping the things all by the user itself has its own advantages and disadvantages. The advantage is that we can carefully select the best product according to our choice and judge the product by seeing, touching and feeling it. The major drawback of this is waiting in stretched out line of customers for paying off the bill. The brought forward intelligent shopping trolley structure avoids this drawback and also has additional features like for the convenience of the consumer. The Intelligent Shopping Cart System helps the customers in minimizing the considerable amount of waiting time that customers used to spend in shopping. In this smart shopping cart system, real-time updates on the inventories are also provided in the store management section.

The main technologies that play a vital role in this proposed system are:
(i) Raspberry Pi for achieving wireless communication with Server
(ii) Infrared sensors for detection of entry and exit
(iii) RFID tags for product identification, and
(iv) Php web application displaying amount payable and managing the inventories detail. It also has an additional discount option in it.
(v) Small tags present in the RFID systems are attached to the products.
(vi) The RFID readers wirelessly read the RFID tag attached to the product for collecting the details of the product, and also assigns the amount.

Thus, RFID systems identify the objects and collect the information about it automatically, similar to the optical bar code readers. The Smart Shopping System with the IntCart has the prospective to make a very smart shopping affair easy, congenial, amiable and systematic to the customers, it also makes controlling of the inventories more comfortable and easier for the store management.

B. PROPOSED ALGORITHM
A. Design Considerations
● Design of a web portal using python, html and php for creating a user-friendly interface for paying bills.
● Use of Raspberry Pi so as to simplify the communication as it has inbuilt WiFi module.
● Display of product details in the card via LCD.
● Automatic scanning of products in the cart using RFID.

B. Description of the Proposed Algorithm

The intelligent shopping system consists of trolleys that are incorporated with RFID readers and in all the items present in the shopping complex a RFID card is separately attached that has distinctive RFID number for different products. As soon as the customer places the product they want to buy into the cart, the RFID reader attached to the cart detects the RFID card number of the product to identify it. Each RFID card number is linked to the product it describes. All the information regarding the product associated with the RFID card is stored in the database which can be retrieved using a centralized server. All the activities are coordinated together using a Raspberry Pi controller. Each one is given a separate login id as of online shopping. When the customer logs in, the information is displayed on the web application. The application is dynamically updated as and when the customer places the bought items into the cart. The details of the item are flashed on the screen attached to the trolley. The addition and removal of the products from the trolley is monitored using IR sensors. When the customer finishes shopping, the server calculates the total bill which would be displayed on the web application. The customer can pay the bill online or through mobile wallet. After the payment of the bill, the database is updated and the user can leave the store. At the exit gate, the RFID reader and an IR sensor checks the bill for confirming that non-billed product is taken by the customer.

C. HARDWARE DESCRIPTION
● LCD Display: It displays the current product that is purchased and the total bill.
● IR sensor: It is used to count the number of products at the exit door as well as for addition and deletion of products from the cart.
● Wi-Fi module: It is in-built in raspberry pi and is used to communicate information
between the cart, server and the web application.

• RFID module: It is used for scanning purposes.

• Web Application: It contains the front-end design for customer login. It also displays the amount to be paid and mode of payment.

• Raspberry Pi: It is a controller which controls all the system components.

**D. SOFTWARE DESCRIPTION**

Python language is used for programming in Raspberry pi. Php is used in the project for the creation of web application so as to display the product in smart phones or any handheld device.

**C. BLOCK DIAGRAM**

**D. FLOW CHART**

**E. RESULTS**

The smart cart is developed successfully with all the above mentioned features and it can be put into use. AmazonGo has recently launched its smart shopping which is similar to this system but with the absence of the web application. The web application designed is very user friendly and can be used to see the map.
of the shopping mall as well. A new user can register via the admin and start shopping. The mode of payment also has 3 options (i.e.) through online wallet using membership card, through credit or debit card, or through cash as the counter. The system developed is feasible and can be easily fit into the cart due to its size. The LCD display, web application and the hardware setup is as shown in the figures below.

F. CONCLUSION AND FUTURE WORK
This prototype involves in providing the customers with a new and easy shopping experience. New technologies are implemented to provide the lowest delay time and smarter solutions. This shopping cart will enhance the method of shopping. Our hypothesis was to design a user friendly shopping cart that would enhance the shopping experience. The customer doesn’t have to wait till the checkout or use their calculators or prick the heads to know how much the shopping cost has come up to and to see if they got it within their money constraints using the alert. Also for a person who is unable to read or find the product price printed on the product while purchasing doesn’t have to seek the help of anyone to know it. They just have to scan the product and the product details are displayed. This shopping cart is user-friendly, reliable and very convenient for the customer. The system can be extended to make the shopping cart “driverless” i.e., to follow the customer who activates the system and hence avoid the hassle of pulling it around. Large figures and tables may span across both columns. Any table or figure that takes up more than 1 column width must be positioned either at the top or at the bottom of the page.

F. APPLICATION

- All shopping malls.
- Grocery Store.
- It can even be utilized in dress showrooms.

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