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RFID Based Automatic Shopping Cart

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ABSTRACT

The introduction of wireless technology along with other communication techniques has made people adopt e-commerce. A contemporary is to look forward to a product is one that aids the comfort, convenience and efficiency in everyday life. In this paper, we discuss an innovative concept of the Automatic shopping cart in which the customer need not have to wait in the queue for billing for hours in shopping malls. Billing will be done automatically as and when the product is added to the cart by using RFID and Arduino. Automatically amount will be deducted in case the customer chooses cancel/ remove the product from the cart.

Key Words: *Arduino, Intelligent shopping cart, RFID shopping cart.*

1. INTRODUCTION

Human beings have always technologically advanced to support their needs ever since the beginning of mankind. The main purpose of innovation in technology, irrespective of the domain, has been in simplifying tasks and making everyday jobs easier and faster. During the last decade, the commercial use of RFID has been growing rapidly all over the world. Furthermore, it is projected that the RFID market will reach an estimated US$18.7 billion by the year 2017 (GIAI, 2012). Everywhere retailers are increasingly embedding RFID technology into their supermarket products in order to improve the customers' shopping experience, customer support and develop new services for customers [1].

RFID is a technology that uses radio waves to track, capture, identify and transfer data efficiently and without human intervention. RFID-based system gathers data about a certain object without touching it or seeing it stag and forwards the information to a host computer [2]. The data on the tag include pointer to the central database within an RFID system. RFID-Readers are able to establish a Channel of communication, read the tags and trace the movement of these objects within the coverage area. RFID is a promising technology, which can improve operational efficiency specially a considerable amount of reduction in transaction costs. Tag detection does not require human intervention therefore reduces employment costs and eliminates human errors during data collection. Due to its flexibility and business efficiency, the RFID technology has been widely adopted in a wide range of applications such as supply chain management and inventory, libraries, equipment and parts maintenance, vehicle identification, tracking people, access control, reliable car tracking, manufacturing line control, automated reading and receipt of goods at end sale points, e-passport and much more (Owunwanne and Goel, 2010). Implementation of RFID based applications has become an objective of many Organizations, partially as a result of the decision made by Wal-Mart, the world's biggest retailer, to implement the RFID technology to monitor flow of pallets and packaging in its supply chain and ask their top 100 vendors deploy RFID. The US Department of Defence, Proctor and Gamble and the European retailer Metro Group require their larger suppliers to implement RFID on every box and pallet shipped to them. The grocery industry is a prime candidate for RFID implementation. On-hand shelf inventory system in the supermarket will be

linked to the store's information system, thus maintaining real time product information and automatic inventory tracking to keeping the correct inventory levels [3]. Using RFID technology in supermarkets can also provide detailed information on customer purchase behaviour. Currently most of the supermarkets use a barcode-based system whereby an item is assigned a serial number printed on the barcode label attached to an item and the item related information is stored in the database of the back-end system. To perform inventory control, someone has to scan the barcode label of each item and compare them with existing inventory list. This is a lengthy and error prone process; as a result, it's done less frequently and hence often is not up-to-date. The capabilities of the barcode technology are limited in term of functionalities that businesses require (Bendavid et al., 2006). RFID technology offers a solution to the above-mentioned problem. Paper is organized as follows. Section II describes automatic text detection using morphological operations, connected component analysis and set of selection or rejection criteria. The flow diagram represents the step of the algorithm. After detection of text, how text region is filled using an Inpainting technique that is given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

2. RELATED WORK

It's our personal experience that today's world don't have patience. They need all the services in the click of the button. Most of the people prefer to leave the shopping mall instead of waiting in long queues to buy a few products, especially during the festive seasons when the shopping malls are providing festive offers and there is a huge crowd. To overcome this issue there are lot of research been done to solve this problem. The author Hasan Al-Sakran propose an RFID agent-based architecture that adopts intelligent agent technology with an RFID based applications. RFID provides capability to uniquely identify an object within a supermarket area, while agents are able to establish a channel of communication which can be used to facilitate communications between a RFID device and supermarket back-end system [1]. The proposed framework includes a design of intelligent mobile shopping cart equipped with both RFID and agent technologies. The author Zeeshan Ali , Reena Sonkusare developed a system that comprises of Cart location detection unit (CLDU), Server Communication unit (SCU), User Interface and display unit (UIDU) and Billing and Inventory management unit (BIMU). CLDU is used to smartly locate the position of shopping cart inside the shopping market to help in obtaining relevant product information. SCU will help in establishing and maintaining the connection of the shopping cart with the main server. UIDU will provide the customer with user interface and BIMU deals with the billing and inventory management in collaboration with the SCU. These units are integrated into a smart enclosed system and are tested to satisfy the functionality [4]. P. Chandrasekar T. Sangeetha provides centralized and automated billing system using RFID and ZigBee communication. Each product of shopping mall, super markets will be provided with a RFID tag, to identify its type. Each shopping cart is designed or implemented with a Product Identification Device (PID) that contains microcontroller, LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID reader on shopping cart, meanwhile product information will be stored into EEPROM attached to it and EEPROM data will be send to Central Billing System through ZigBee module. The central billing system gets the cart information and EEPROM data, it access the product database and calculates the total amount of purchasing for that particular cart. Main aim of this paper was to provide an automatic billing to avoid queue in malls and super markets [5]. Galande Jayshree, Rutuja Gholap, Preeti Yadav RFID Based Automatic Billing Trolley as developed a system that can be used in shopping malls to solve the above mentioned challenge. The system will be placed in all the trolleys. It will consist of a RFID reader. All the products in the mall will be equipped with RFID tags. When a person puts any products in the trolley, its code will be detected and the price of those products will be stored in memory.As we put the products, the costs will get added to total bill. Thus the billing will be done in the trolley itself. Item name and its cost will be displayed on LCD. Also the products name and its cost can be announced using headset. At the billing Counter the total bill data will be transferred to PC by wireless RF modules [6].

3. METHODOLOGY

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This system have the following components: a. shopping trolley b. RFID reader c. Items with RFID tag d) shopping trolley is embedded with display, to display the bill to customer.

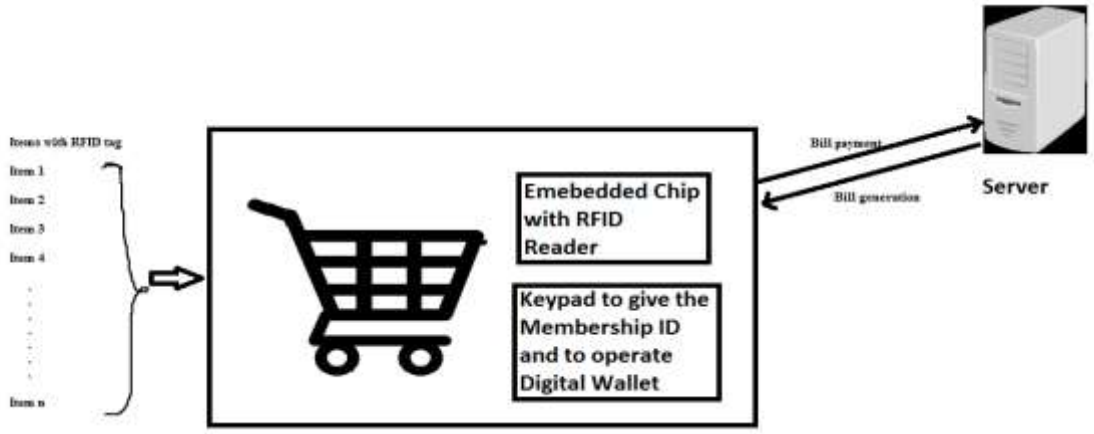

Figure1.1: System Model

Work Flow of the system is as follows:

- The customer drops the items to be purchased in the shopping trolley which is embedded with a RFID reader and a screen displaying the details like cost of item, total bill, membership ID etc.
- Items should have the RFID tag that will allow to read the price and calculate the price of the items added in trolley. Items if removed from trolley, the amount will be subtracted automatically.
- Once the customer is done with adding the items, the customer needs to press “close”. The trolley is closed and no more items can be added/removed from trolley.
- If the customer is registered or having a membership of the store, customer have to enter the membership ID.
- The Member ID, details of customer, Items purchased is sent to the server.
- Server checkout the store details, offers running on products, special offers given to specific customer and if any offers are applicable, applies to the product and recalculate the bill and sends to the trolley to display on screen as well as sends a SMS of the total bill amount to the customer with the link for making payment online/App.
- The customer need not have to wait in queue for billing and waste his time, the customer can directly use E-wallet of store/third party wallet/any Digital payment mode to pay the bill.
- Once the bill is paid, the server is updated and acknowledge to the customer is sent by SMS as well as is displayed on shopping trolley.

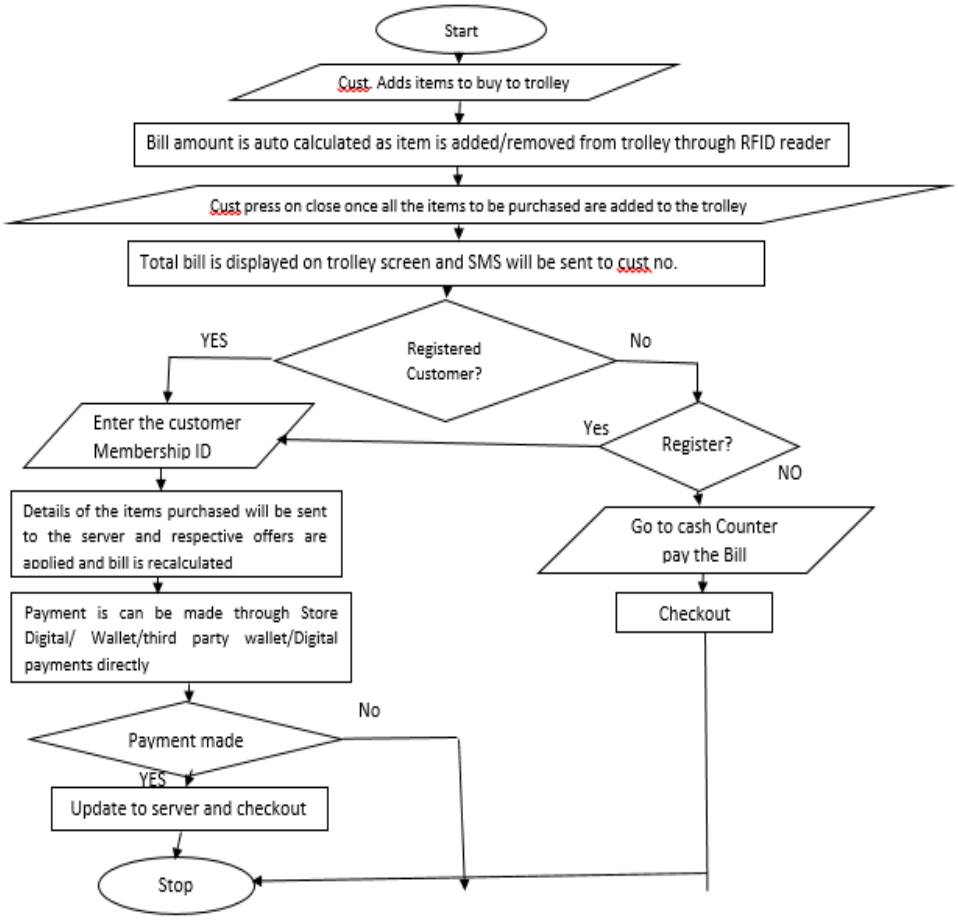

Figure 1.2: Work Flow

Figure 1.3: One Item Added

Figure 1.4: Two Item Added

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4. CONCLUSION

The proposed model is easy to use, low-priced and does not require any special training. As the whole system is smart, the requirement of manpower will decrease, thus benefiting the retailers. The time efficiency will increase phenomenally since this system will eliminate the waiting queues. The model can be further extended to implement secured checkout at the shopping mall exit and develop a prediction model for customer behaviour based on the items frequently purchased thus providing the customers better services, improved consumer experience and reducing customer waiting time to a greater extent.

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