SMART SHOPPING TROLLEY USING RFID

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***Abstract*- A shopping mall or complex is a place where people buy product/s for their regular use. The customers have to wait in long queues to get their products scanned using barcode scanner and get it billed. To get rid of this, we have proposed a new 'Smart Shopping Trolley using RFID (Radio Frequency Identification)'. This implementation is used to assist a person while shopping and also to avoid standing in long queues and thus saving time. The smart shopping trolley would consist of a microcontroller, Android Device, RFID Reader and an Electronic Display. The products in the shopping centers will have RFID tags to retrieve/access information about it. When a customer places a product in the smart trolley, the RFID Reader will read the Product ID and the information related to it will be stored in controller. There will be communication between android device, main server and billing system (gate system) via ZigBee module. The total amount of the products in the trolley will be calculated using android device and will be updated on server and the Central billing System.**

***Index Terms*- RFID Reader, RFID tags, Central Billing System, Wireless ZigBee Module, Android, Security, Central Server Database.**

I.

Humans have always invented and developed a technology to support their needs ever since the beginning of mankind. The basic purpose of advancement in technology has been in minimizing tasks and making everyday chores easier and faster, irrespective of the various domains available. A major task on which human beings are found spending considerable amount of time is shopping. According to a Survey, approximately most of the humans spend 1.5 hours daily on shopping. A large number of customers will always tend to walk out of a queue if the queue is very long. The current shopping environment can simply be classified into two categories (1) Shopping in-person and (2) Shopping in absentia. Shopping in-absentia is supported in many ways including online shopping, tele-shopping, etc. wherein a shopper or a customer does not have to be present physically in the shopping arena. Shopping in-person involves a personal visit of a person to the shopping malls or centres and selecting the product/s based on the various factors including need, fashion, convenience, brand, etc.

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The enhanced Smart Shopping Cart System intends to assist shopping in-person which will minimize the considerable amount of time spent in shopping. It is also aimed in providing the store management section with real-time updates on the inventory. The proposed system is based on four important technologies (i) Infrared sensors (ii) RFID tags for product identification (iii) ZigBee for achieving wireless communication with Server, and (iv) Integrated System with display for billing and inventory management. Radio frequency identification (RFID) is a rapidly growing technology. RFID systems consist of small tags, attached to physical objects. When wirelessly interrogated by RFID Readers, tags respond with some identifying information that may be associated with arbitrary data records. Thus, RFID systems are one type of automatic identification system, similar to optical bar codes. In this paper, we discuss about opportunities of enhancing the cart to make it into a commercially viable product as an excellent way to help customers reduce the time spent in shopping by displaying the list of products, their cost and automatic billing. The system helps the store management section with an automatic update of the inventory on every purchase of a product. The Smart Shopping Cart has the potential to make the shopping experience more comfortable, pleasurable and efficient for the customer and the inventory control easier for the store management.

II. LITERATURE SURVEY

Dr. Suryaprasad J in "A Novel Low-Cost Intelligent Shopping Cart" [1] proposed to develop a low-cost intelligent shopping aid that assists the customer to search and select products and inform the customer on any special deals available on the products as they move around in the shopping complex.

Amine Karmouche in "Aisle-level Scanning for Pervasive RFID-based Shopping Applications" [2] proposed to develop a system that is able to scan dynamic and static products in the shopping space using RFID Reader antennas. Instead of conducting the RFID observations at the level of individual carts, aisle-level scanning is performed.

Satish Kamble in "Developing a Multitasking Shopping Trolley Based on RFID Technology" [4] proposed to develop a product to assist a person in everyday shopping in terms of reduced time spent while purchasing. The main aim of proposed system is to provide a technology oriented, low-cost, easily scalable, and rugged system for assisting shopping in person.

Mr. P. Chandrasekar in "Smart Shopping Cart with Automatic billing System through RFID and ZigBee" [5] proposed to develop a shopping cart with a Product Identification Device (PID) which will contain a microcontroller, a 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 this 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.

III. SYSTEM DESIGN

Objective: To develop a low-cost intelligent shopping aid that assists the customer to locate and select product/s and inform them on the product/s details dynamically as they move in the shopping arena. Additionally, with each product identified uniquely and usage of centralized server, support billing and inventory updates.

A. SYSTEM ARCHITECTURE

Each trolley is attached with Product Identification Device (PID). Through ZigBee communication, PID device sends its information to automated central billing system, where the net price of all the purchased products is calculated. Customer can get their billing information at the billing or packing section according to their trolley Identification Number. Even there is no need for a cash collector, if in case a customer uses their debit/credit for the net bill payment. The automated central billing system consists of a ZigBee transceiver and a server/system connected to access product database.

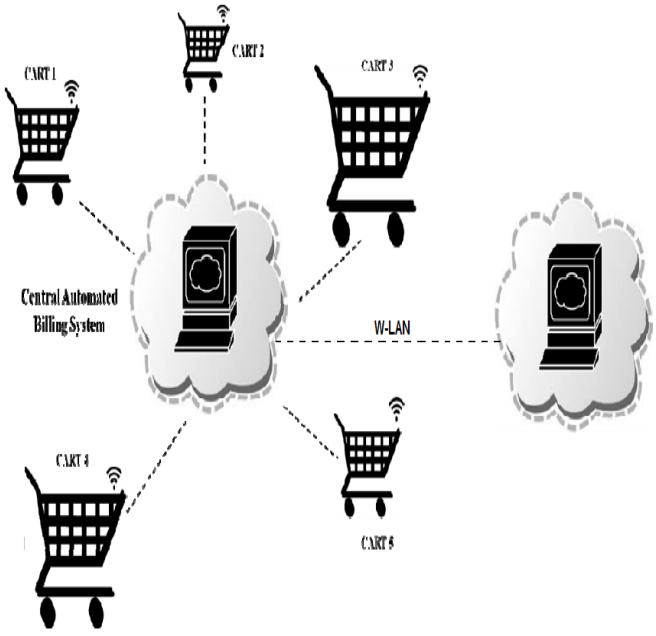

Fig. 3. Central Automated Billing System product database.

B. SYSTEM WORKING

When the customer enters the shopping mall, he/she will receive a trolley on which there will be a RFID Reader, LCD Display and Android device. The trolley will start its processing once the vendor presses the 'START" button on the trolley which will be only seen by the vendor. Thus, now the customer can use the smart trolley for shopping. Whenever the customer places a product into the trolley, the RFID Reader will read the tag information and display the related results on the LCD Display. These steps are repeated till the customer finishes his shopping and the "STOP" button is pressed by the vendor. Once the "STOP" button is pressed there is an option provided to end the shopping with the same purchased products or to delete or remove some of the products from the trolley. This totally depends on the customer choice. At the end of shopping, the customer can straight away pay the bill and leave the shopping center. Inventory status of the products is also updated at the end of shopping.

IV. CONCLUSION

THE SMART SHOPPING TROLLEY APPLICATION CREATES AN AUTOMATED CENTRAL BILLING SYSTEM (ACBS) FOR SUPERMARKETS AND MALLS. USING PID (PRODUCT IDENTIFICATION), CUSTOMERS WILL NOT HAVE TO WAIT NEAR CASH COUNTERS FOR THEIR BILL PAYMENT. SINCE THEIR PURCHASED PRODUCT INFORMATION IS TRANSFERRED TO CENTRAL BILLING SYSTEM. CUSTOMERS CAN PAY THEIR BILL THROUGH CREDIT/DEBIT CARDS AS WELL.

THE SYSTEM PROPOSED IS HIGHLY DEPENDABLE, AUTHENTIC, TRUSTWORTHY AND TIME-EFFECTIVE. THERE WILL BE REDUCTION IN SALARY AMOUNT GIVEN TO EMPLOYEES, REDUCTION IN THEFT. ALSO, THE SYSTEM IS VERY TIME-EFFICIENT.

V. FUTURE SCOPE

The proposed Smart Shopping Trolley System intends to assist shopping in-person which will minimize the considerable amount of time spent in shopping as well as to time required in locating the desired product with ease. The customer just needs to type the name of the product he wants to search on the Android device, and the cart will automatically guide him/her to the product/s locations.

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