

Smart Shopping Trolley Using RFID

^{#1}Supriya Sharma, ^{#2}Komal Ambekar, ^{#3}Vinayak Dhole, ^{#4}Tushar Wadekar



³dholevinayak03@gmail.com,

²komalambekar26@gmail.com

^{#1234}SKNSITS, Lonavala, Savitribai phule pune University.

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.

Keywords— RFID Reader, RFID tags, Central Billing System, Wireless ZigBee Module, Android, Security, Central Server Database.

ARTICLE INFO

Article History

Received :24th May 2016

Received in revised form :
26th May 2016

Accepted : 28th May 2016

Published online :

30th May 2016

I. INTRODUCTION

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.

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.

Organization of Paper:

While starting with literature survey we will discuss the proposed system with architecture and its test results. Then conclusion derived from the approaches we used and future scope of enhancement. At the end references used for preparing this paper are shown.

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. PROPOSED SYSTEM

Cart is attached with Bluetooth controller, Android device and RFID reader. The Bluetooth Controller will send data to Android device. Android device sends its information to central ABS. There it calculates net price for the purchased products. Customer can get their billing information at the packing section. At the main gate, sensors will detect theft.

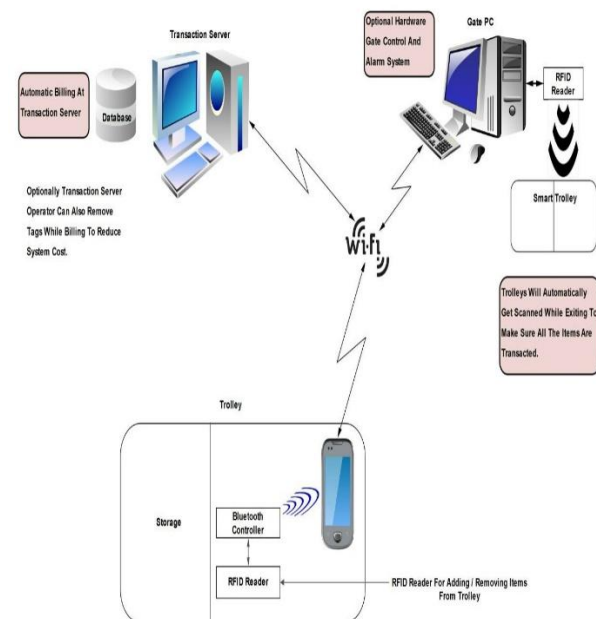


Figure1: Architecture

IV. HARDWARE USED

Trolley Unit:

In this unit, the system is attached to a RFID reader and Bluetooth Controller. As the user puts the items in the trolley the reader on the trolley reads the tag and sends a signal via Bluetooth Controller to the system. If it matches then it shows the name of item on android device & also shows the total amount of items purchased.

Billing Unit:

As soon as the shopping is over the user comes near the billing section. The total bill will display on the billing computer.

RFID Tags:

Tags are of two types: passive tags which have no battery life and active tags which have battery life. RFID tags released for automatically identifying a person, a package or an items. These are transponders that transmit information. RFID tag contains two parts. One is integrated circuit for modulating, storing and processing information and demodulating radio frequency (RF) signal. The second is an antenna for receiving and transmitting signal.

RFID Reader:

RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consists of an oscillator to create the carrier frequency; a modulator to make impact on data commands upon this carrier signal & a receiver that contains demodulator to extract the data returned.

ALGORITHM

Relationship between login input, functions and output:

Let S be the system such that
 $S = \{A, Sr, C, T, P, Tr\}$

- Step1: Start
- Step2: Initialize System
- Step3: Search for products
- Step4: Scan RFID tags
- Step5: Read related data from memory
- Step6: Display data on Android Device
- Step7: Add item costs in database as items are added
- Step8: When upload key is pressed send data to the counter
- Step9: Print the Bill
- Step10: Stop

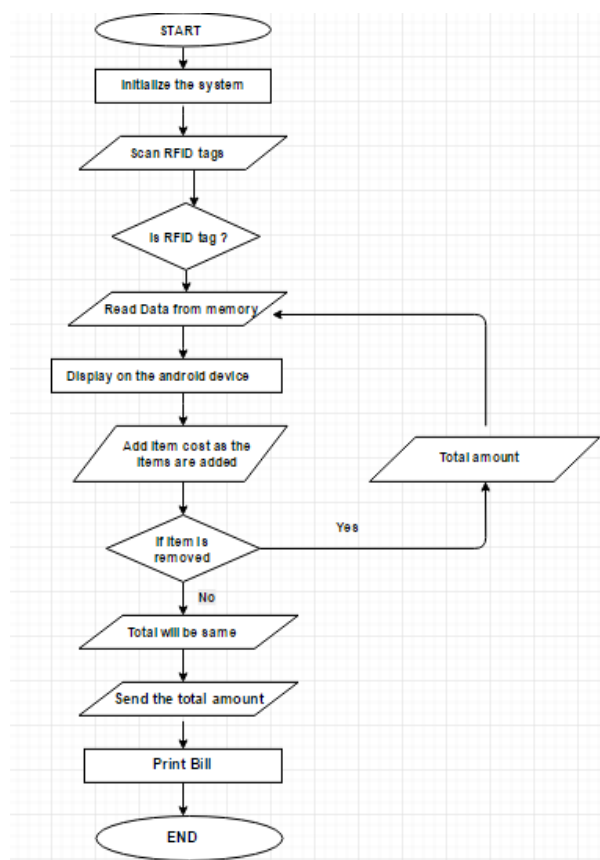
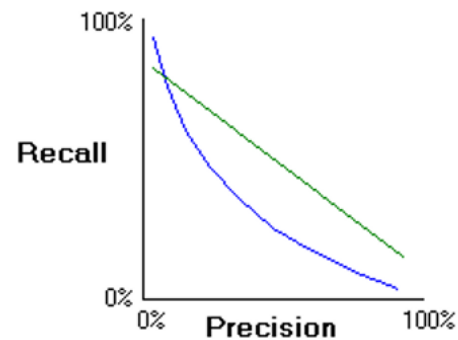


Fig: Flowchart of Proposed System

Result and Analysis

1. The utility of trolley will be first of its kind for commercial use. 2. This device records the data of the different products with help of the suitable sensors like RFID Tags. 3. This recorded data helps the shop owner with detailed analysis of shopping by the customer & their preferences through the computer; printout of the same can be obtained.

VI. Precision & Recall



Precision and recall are the basic measures used in evaluating search strategies. There is a set of records in the database which is relevant to the search topic records are assumed to be either relevant or irrelevant (these measures do not allow for degrees of relevancy). The actual retrieval set may not perfectly match the set of relevant records.

VII. 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.

VIII. 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.

REFERENCES

- [1] Dr. Suryaprasad J, Praveen Kumar B O, Roopa D & Arjun A K "A Novel Low-Cost Intelligent Shopping Cart", 2014 IEEE.
- [2] Amine Karmouche, Yassine Salih-Alj, "Aisle-level Scanning for Pervasive RFID-based Shopping Applications", 2013 IEEE.
- [3] Martin Mayer, Nobert Gortz and Jelena Kaitovic, "RFID Tag Acquisition via Compressed Sensing", 2014 IEEE.

[4] Satish Kamble, Sachin Meshram, Rahul Thokal & Roshan Gakre, "Developing a Multitasking Shopping Trolley based on RFID Technology", January 2014 International Journal of Soft Computing and Engineering (IJSCE).

[5] Mr. P. Chandrasekar, Ms. T. Sangeetha, "Smart Shopping Cart with Automatic Central Billing System through RFID and ZigBee", 2014 IEEE.

[6] Zeeshan Ali, Reena Sonkusare, "RFID Based Smart Shopping and Billing", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2013.

[7] D. Hahnel, W. Burgard, D. Fox K. Fishkin and M. Philipose, "Mapping and localization with RFID technology", Proc. IEEE Int. Conf Robot. Autom, pp.1015 - 1020 2004.

[8] H. H. Bi and D. K. Lin, "RFID-enabled discovery of supply networks", IEEE Trans. Eng. Manag., vol. 56, no. 1, pp.129 -141 2009.

[9] Y. J. Zuo, "Survivable RFID systems: Issues, challenges, and techniques", IEEE Trans. Syst., Man, Cybern. C, Appl. Rev., vol. 40, no. 4, pp.406 -418 2010.

[10] S. S. Saad and Z. S. Nakad, "A standalone RFID indoor positioning system using passive tags", IEEE Trans. Ind. Electron., vol. 58, no. 5, pp.1961 -1970 2011