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Smart Trolley with Automatic Bill Generation Using RFID

Tapaswi mestry, Sayali Jagdale, Rashmi Deshpandey
Department Of Information Technology,
Siddhant college of Engineering,
Savitribai Phule Pune University,
Pune, India.
Corresponding author: Tapaswi mestry

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ABSTRACT - Shopping mall is a place where most people get their daily necessities products such as food product, apparels, electrical appliances and many others. The numbers of small and large shopping malls keep on increasing over the years throughout the globe due to the demand of the public. Thus, the level of advancement of shopping mall system and infrastructure also varies. We have seen long queues in the supermarket that takes most of the time. While shopping consumers face many problems like worrying that amount of money brought is not sufficient, incomplete information about of the items. Other than this they have to select the best product out of thousands of products. Also, want to revolutionize the entire shopping mechanism in the supermarket and attract number of customers reduce the labour cost. The problems stated above might eventually be solved or else im- proved by the implementation of RFID technology in shopping mall. ThiscanbedonebysimplyattachanRFIDtagtoalltheitemsinshop- ping mall and attach a RFID reader with a Android device through the server application. this can solve all the aboveproblems.

Keyword – Data Gathering, RFID, Active Tags, Passive Tags, Server Database.

I. INTRODUCTION

Shopping mall is a place where most people get their daily necessities products such as food product, apparels,electricalappliances,and many others. The numbers of small and large shopping malls keep on increasing over the years throughout the globe due to the demand of the public. Thus, the level of advancement of shopping mall system and infrastructure also varies.

The number of different techniques are evolving day by day which reduce the human efforts and reduce the labour cost.Compared to some foreign countries shopping mall system, there are still plenty of spaces for improvement in terms of providing quality shopping experience to the consumers. Consumers often face problems and inconvenience when shopping. These problems include worrying that the amount of money brought is not enough for paying all the items wanted, in- sufficient information of the items that are for sale and also wasting unnecessary time at the cashier. These are the problems that are currently faced by most consumers. There are some existing methods to solve the problems that are stated above but the effectiveness still con- sider improvable. Examples of existing problem solving techniques are substituting the conventional way of keying item per item by hand to the cash register with the technology of barcode scanning where the price are stored in the barcode, and also set up a customer information counter to help the consumer if there are any enquiries about theitems at shopping mall.

The problems stated above might eventually be solved or else im- proved by the implementation of RFID technology in shopping mall. This can be done by simply attach an RFID tag to all the items in shop- ping mall and attach a RFID reader with a Android device through the server application. this can solve all the aboveproblems.

The enhanced Smart Shopping Cart System intends to assist shop- ping 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) RFID READER (ii) RFID tags for product identification (iii) Wifi module for achieving wireless communication with Server, and (iv) Android devive for listing products and inventory management.

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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 bill generating. 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

1. Mr.P. Chandrasekar and Ms.T. Sangeetha in Smart Shopping Cart with Automatic Billing System through RFID and ZigBee1 cre- ates an automated central bill system for themall.

Radio frequency identification (RFID) technology may not only be useful for streamlining inventory and supply chains: it could also make shoppers swarm. ZigBee is based on an IEEE 802.15 standard. ZigBee devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones, creating a mesh network; i.e., a network with no central- ized control or high-power transmitter/ receiver able to reach all of the networked devices. This paper provides centralized and au- tomated 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 de- signed 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, mean while product in- formation will be stored into EEPROM attached to it and EEP- ROM 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 supermarkets.

2. Komal Ambekar,VinayakDhole,Supriyasharma and Tushar Wadekar in Smart Shopping Trolley using Rfid createthesystemwhich uses the LCD display as android device mounted on the trolley the generatebill.

They 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 Bluetooth controller, 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 an- droid device, main server and billing system (gate system) via Bluetooth module. The total amount of the products in the trol- ley will be calculated using android device and will be updated on server and the Central billingSystem.

3. Kalyani Dawkhar,ShraddhaDhomase and SamruddhiMahabalesh- warkar in Electronic Shopping Cart For Effective shopping based on RFID they conclude that the time required for billing in the shopping malls is cut down in self-scanning

They have been developed a smart way for shopping in malls. Each and every product has RFID tag instead of barcode. The smart trolley will have RFID reader, LCD display. When a per- son put any product in the trolley it will scan and the cost, name and expire date of the product will display. Cost will add into final bill. Bill will be stored in microcontroller memory. It will transfer from RF transmitter to RF receiver. Receiver willtransfer this information to the PC through serial communication. For this project we used Embedded C and VB6.0 software.

4. Zeeshan Ali and Reena Sonkusare in RFID Based Smart Shopping and Billing they make more utilization of LCD like removing the atom by cancel button on LCDimplemented.

The proposed Smart Shopping Cart system intends to assist shop- ping in-person that will minimize the time spent in shopping as well as locate the desired product with ease. It is also aimed in aiding the store management with real-time updates on the inven- tory. The proposed system is based on four important technolo- gies (i) Infrared sensors used in an intelligent manner for

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dynamic location detection and tracking (ii) RFID tags for product identi- fication (iii) ZigBee for achieving wireless communication with Server, and (iv) Integrating System with display for billing and inventory management[1]. All of these are discussed in detail in different sections. One of the critical design decisions has beenin developing a novel approach to dynamically detect the loca- tion of the shopping cart and integrating it suitably into a useful low cost embedded system. Widely used location determination technologies including Global Positioning Systems (GPS) does not augur well for solving the proposed problem. Some demer- its include, higher implementation cost, movement of cart in an enclosed area, and location accuracy. In this paper,we discussthe System Design, Working, Testing, and Conclusions. In con- clusions we discuss about opportunities of improving 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 [2]. The system helps the store management with an automatic update of the inventory on every purchase of an item. The Smart Shopping Cart has the potential to make the shopping experience more pleasur- able and efficient for the shopper and the inventory control easier for the store management.

III. PROPOSED SYSTEM

Each trolley is connected to the server system. Through Wificommunication,the trolley sends its information to automated central billing system, where the net price of all the purchased products is calculated and update the data to the android device. Customer canget their billing information at the billing or packing section accord- ing to their trolley Identification Number. The RFID Anti-theft system is also connected to the server system.This anti-theft system is used to detect the thieves in the shoppingmall.

SystemArchitecture-

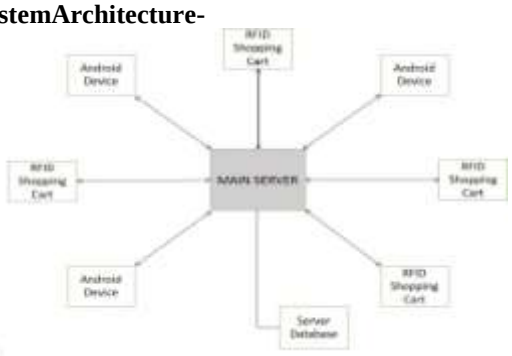


Fig.1:-System Architecture level 0

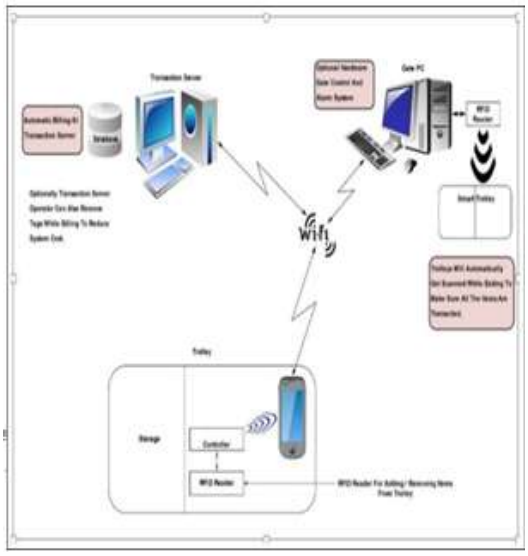
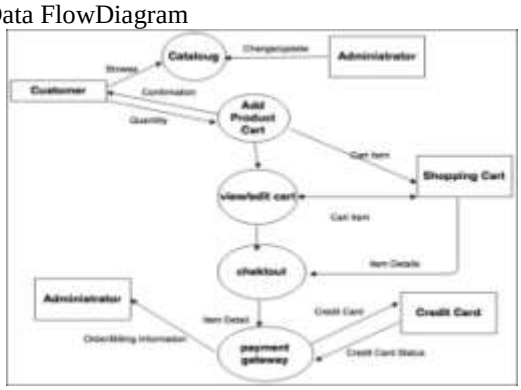


Fig: System Architecture level 1

In our Smart Trolley system, each product will have the passive Radio Frequency ID tag which is bearing a unique Electronic Prod- uct Code. This Electronic Product Code provides the info like name, price etc about the product. When the customer will put the product in the Trolley, the Radio Frequency ID scans the tag and the Elec- tronic Product Code number is known by Radio Frequency ID reader. Radio Frequency ID reader passes the Electronic Product Code to the ARM 7 micro-controller where ARM 7 compares the Electronic Prod- uct Code with the database of the system containing various products. The ARM 7 microcontroller also passes the data obtained from the database to the RF transmitter fromwhere the data is wirelessly trans- mitted to the billing computer. The master computer receives this data through RF receiver using Max 232 interface. Max 232 interface is the interconnection media between the RF receiver and thecomputer.

Data FlowDiagram



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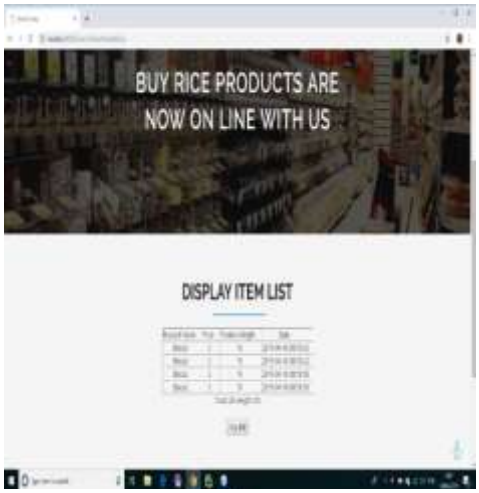
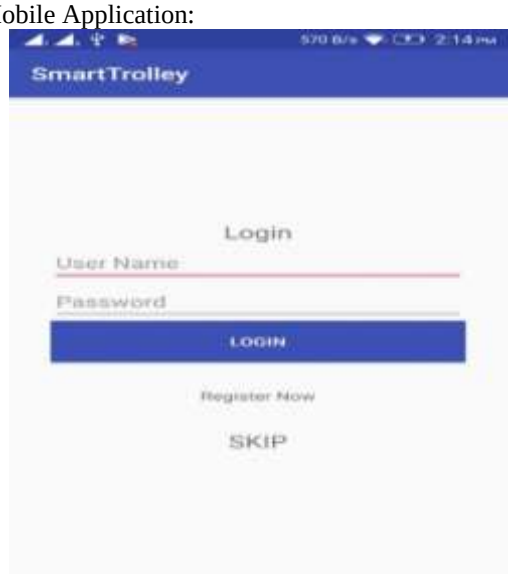
V. RESULT

1. User interface screen will be log in screen first.
2. User has to register first and then add balance into his account if wished to.
3. User interface will provide good look and feel effect so that it will be user friendly.
4. And He/ She can operate system very efficiently.

Web Application:



Mobile Application:



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Comparative results of existing and proposed system is asfollow,

Sr. no.	Exisiting System	Proposed System
1	Barcode technology is used for billing.	RFID technology is used for billing.
2	Each customer has to go to the billing desk to know the grand total of all the items to be purchased.	With the help of mobile application, every customer gets to know the grand total simultaneously while adding or removing the products in the trolley itself.
3	Getting product information is difficult and time consuming.	Getting product information like MRP, expiry date, etc. is easy and no extra time is needed.
4	According to a survey conducted, due to the existing model every customer has to wait in long queues to pay the bills which leads to wastage of time and loss of customers for small and big retailers.	With the utilization of mobile application technology the bill is wirelessly communicated to the server and when the customer comes at the billing section, the bill is generated saving the time and reducing the rush
5	Low product cost but overall expenses are much high.	Product is little expensive but overall expense is much low.

VI. CONCLUSION

The Smart Trolley was designed to function as a system providing users the flexibility within the retail store.It is designed to be highly efficient and fully synchronized with the retailers current system. A detailed market description and competitive analysis of the product market and its attributes were presented in this report. The target market identified was the big retailers; howeverconsumers are the directbeneficiaries. From the feedback responses obtained from both the Functional Assessment and Strategic Assessment phases, the Smart Trolley will gain a very good market. This will attract partners and funding once the product is available in themarket.

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