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Automated Shopping Trolley: A Smart Billing System

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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.
Keywords: RFID Tag, RFID Reader, Microcontroller, Wi-Fi Model.

I. INTRODUCTION

The number of different techniques is 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 system is based on four important technologies (i) RFID READER (ii) RFID tags for product identification (iii) Wi-fi module for achieving wireless communication with Server, and (iv) Android device for listing products 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 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

A. Mr. P. Chandrasekar and ms. T. Sangeetha in smart shopping cart with automatic billing system through rfid and zigbee1 creates an automated central bill system for the mall. Radio frequency identification (rfid) technology may not only be useful for stream lining 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 centralized control or high-power transmitter/receiver able to reach all of the networked devices. This paper 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 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 super markets.

B. Komal ambekar,vinayak dhole,supriya sharma and tushar wadekar in smart shopping trolley using rfid create the system which uses the lcd display as android device mounted on the trolley the generate bill.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 trolley will be calculated using android device and will be updated on server and the central billing system.

C. Kalyani dawkhar, shraddha dhomase and samruddhi mahabaleshwarkar 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 person 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 will transfer this information to the pc through serial communication. For this project we used embedded c and vb6.0 software.

D. 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 lcd implemented. The proposed smart shopping cart system intends to assist shopping 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 inventory. The proposed system is based on four important technologies (i) infrared sensors used in an intelligent manner for dynamic location detection and tracking (ii) rfid tags for product identification (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 been in developing a novel approach to dynamically detect the location 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 demerits include, higher implementation cost, movement of cart in an enclosed area, and location accuracy. In this paper, we discuss the system design, working, testing, and conclusions. In conclusions 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 pleasurable and efficient for the shopper and the inventory control easier for the store management.

III.PROPOSED SYSTEM

In our Smart Trolley system, each product will have the passive Radio Frequency ID tag which is bearing a unique. Electronic Product 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 Electronic 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 from where 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 the computer.

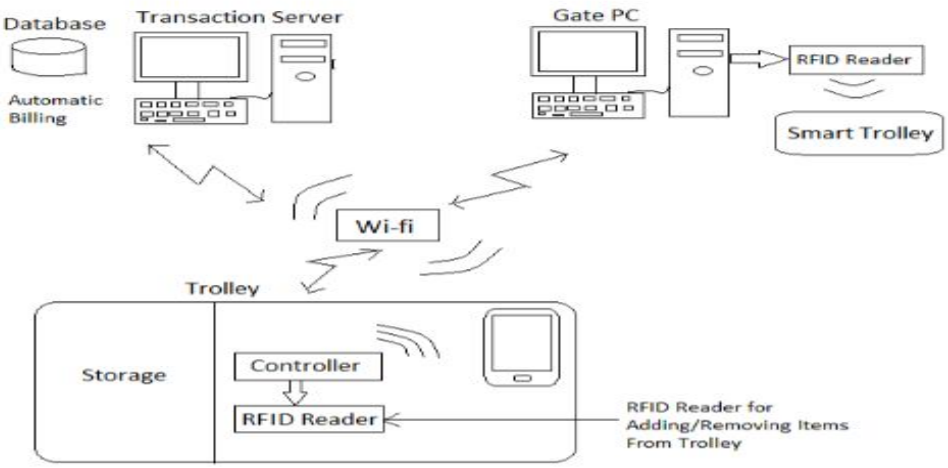


Fig1. System architecture

IV. ALGORITHM

A. Smart Cart Sends Requests To The Server

1) while read T I||HMAC(T I) do
2) compute the HMAC using the secret key stored at the smart cart: HMAC'(T I) = HMACs(T I).
3) if HMAC'(T I) = HMAC(T I) then
4) compute EPs(DSi(T I, i, T, s1, s2), T I, i, s1, s2),
5) send EPs(DSi(T I, i, T, s1, s2), T I, i, s1, s2) to the server.
6) Else
7) send an alarm.
8) end if
9) end while

B. Server Responds To Smart Cart

1) while receive EPs(DSi(T I, i, T, s1, s2), T I, i, s1, s2) do
2) decrypt the message: (DSi(TI, i, T, s1, s2), T I, i,s1,s2) = DSs(EPs(DSi(T I, i, T, s1, s2), T I, i, s1, s2)),
3) Compute (T I', I', T', s'1, s'2) = EPi(DSi(T I, i, T, s1, s2)) , check if TI' = TI, I' = i and T' is valid.
4) if T I' = TI, I' = i and T' is valid, then
5) Look for Info(TI) in the server database.
6) compute Es1(Info(TI), T)||MACs2(Es1(Info(T I), T)) and sends it to the smart cart.
7) Else
8) discard the message.
9) end if
10) end while

V. ADVANTAGES

A. Time effective process
B. Accuracy in budget management.
C. Easy to use

VI. METHODOLOGY

A. RFID Technology

RFID is an abbreviation for radio frequency identification. RFID tags are nothing but small chips which looks like a smart card or visiting card that are used in our day to day life. These small chips along with an RFID reader forms the RFID system.
Electromagnetic fields are used by RFID to automatically identify and track tags attached to objects. Electronically the information is stored in Tags. From a nearby RFID readers interrogating radio waves Passive tags collect energy.

B. RFID Reader

The RFID reader contains a radio transmitter and receiver inside. On powering the reader transmits radio frequency signals continuously. When an RFID tag is placed inside the range area of a RFID reader, the tag is energized through electromagnetic induction and collects the information from it.

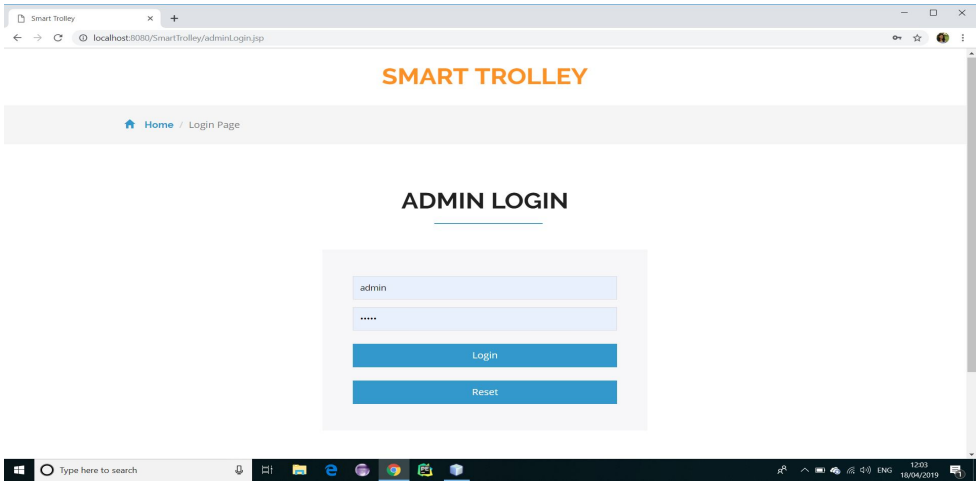
C. RFID Tag

In different types of shapes and sizes RFID Tags are available. An IC is used for storing data, for transmitting and receiving data antenna is used, and a modulator is also used. As the Tags are very small in size they can hold only few bits of data. There are two types of RFID tags:

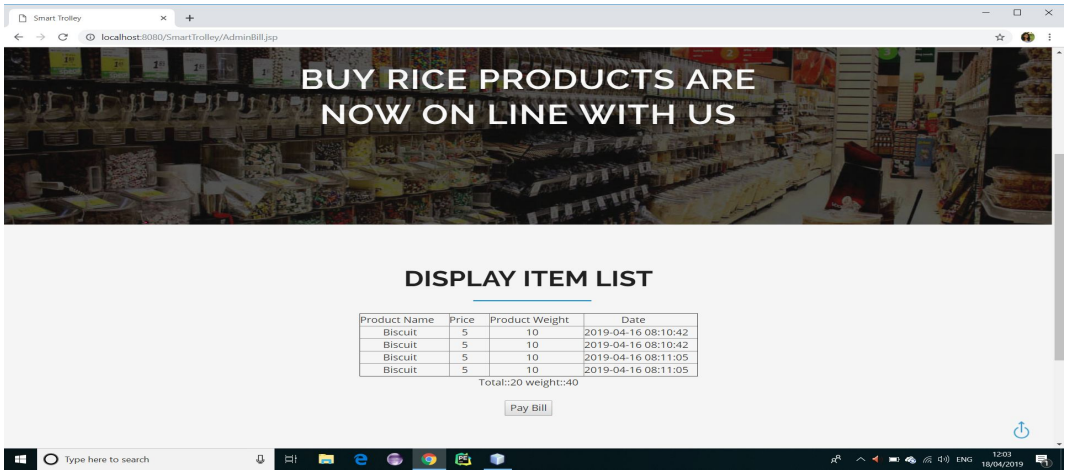
1) Active RFID Tags
2) Passive RFID Tags

VII. RESULTS

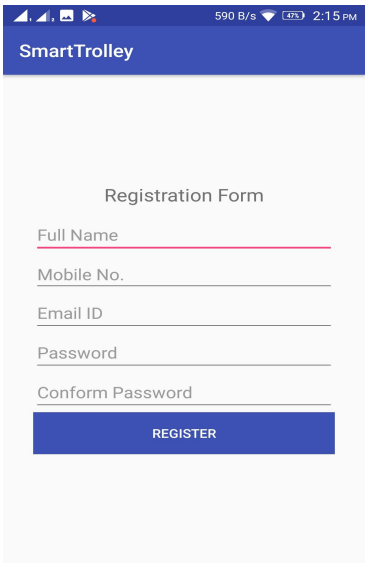
A. Admin Login



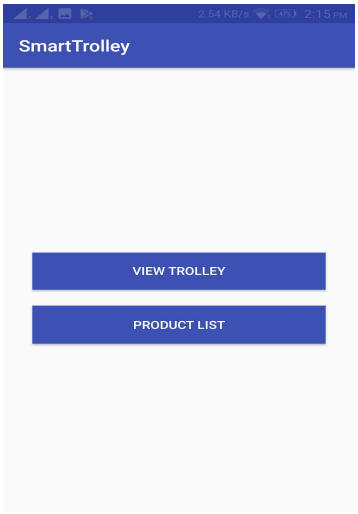
B. Item List



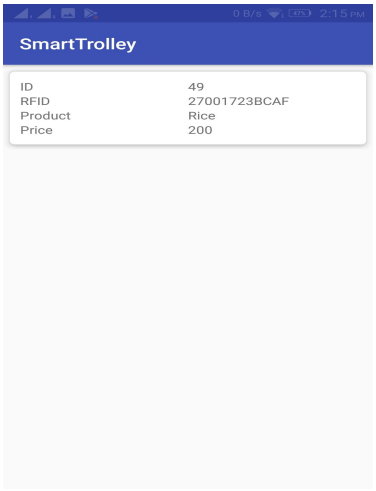
C. User Registration



D. Option List



E. Product List



VIII. CONCLUSION

Here we conclude our system which is developed in IOT is presented1. 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 synchronised 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; however consumers are the direct beneficiaries. 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 the market.

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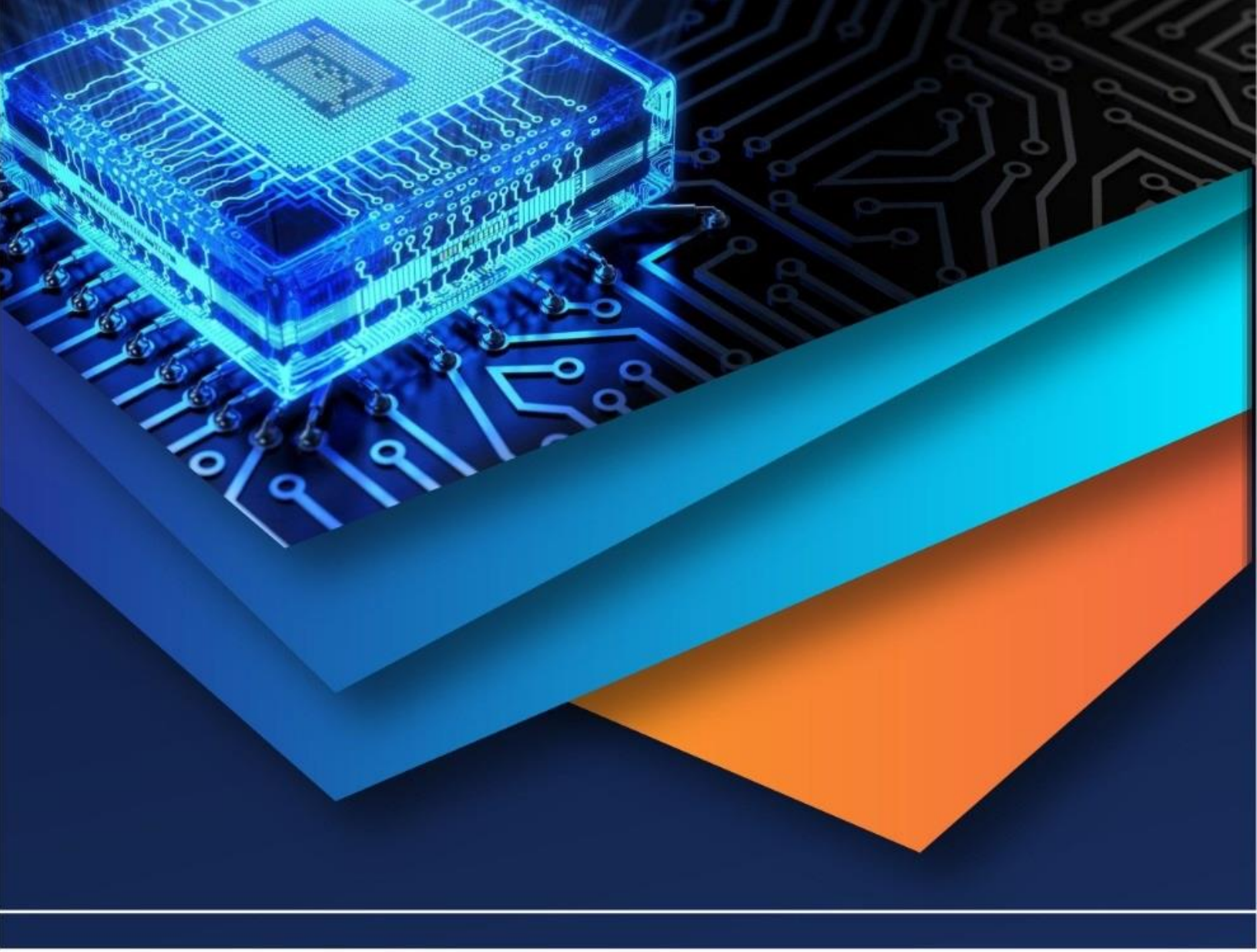

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