A STUDY ON AUTOMATIC SHOPPING CART IN MEGA MALL

Himani Pangasa1*, Nathi Ram Chauhan2

Department of Mechanical and Automation, Indira Gandhi Technical University for Women
Kashmiri Gate, Delhi, India
Tel: +91-9654817062, Email: him.pangasa@gmail.com

Abstract. Now a day’s automation has changed the way of living of the humans. All probable one of us pursue for an eminence in our everyday lives. Therefore this has emanated in large imbue at procure items which have led to extended queues at the check-out because the patron needs to scan all probable article and then go into the billing section. The line in billing point is bit time and effort consuming. It can be called as “Modish Cart with Instant bill” to Ease line at shopping mall. The brief interpretation of its working is, when customer pick an artefact and drop item into the cart, the RFID reader scan the artefact’s distinctive code and it is secure. And it gets shown on LCD/LED/OLED screen. After customer has consummate with the procure customer has to go to the billing section to pay the bill and can move out from checkout gate. This will conserve the epoch that was prior being consumed to get desired items.

Key Words: RFID, Automatic trolley, Smart cart, Barcode, Microcontroller

1. Introduction

In the shopping mall to procure items, customer have to be in long queues. Those queues are very time consuming. One third of major patron acquire stuff on a monetary plan. Most of the time, it is only at the end of acquiring goods patron come to know that the gross amount comprehensive is out of the budget [1-10]. Then they spend much time in penning for the needful artefacts and finally gross procure amount this gets more time consuming. Due to these, several time patrons couldn’t acquire all their chosen artefacts and miss out few artefacts. A major trouble overlooked by customers is that they have to halt in long queue for check [11-15]. Thus, the propound system approach all these pitfalls faced by patron in procure items and overcome them. Now a day’s purchasing and Procure at mega malls is hectic in big cities. Big hasten can be seen at these shopping centres on weekends and holidays [13-19]. This horde is enormous when there are exceptional offer and deduction going on. People select desired artefact and put them in the cart. After finishing shopping, one has to go to check out point for paying bill. At check out, the cashier needs to prepares the final bill by barcode reader that is time-consuming procedure and consequence in long line at check out and results in line at billing centre [20-24].

The basic concept of this project is positioned upon the lines of the “AUTO CHECK FOR SHOPPING” used in the malls and shopping Centres. A device “MODISH CART” is a statistics storage. The system is a means for merchandiser to the customers for being timely billing and to uncomplicate the shopping.

2. Literature review

2.1 Radio Frequency Identification Device Based Trolley for Automatic Billing [5]:

In this paper the researcher delineation system for procure items from mall. The system is installed in the carts. It consists of RFID reader and every artefact has RFID badge. When a person puts any artefact in the cart its code is observed and the show of those artefact information in their purchased item list as customer put the artefact the amount gets summed to bill. The billing is done in cart itself. Article information and its amount is shown on LCD. The disadvantage of this paper is after fulfilment of shopping a button is pressed so that the final bill of all the artefacts can be generated. After pressing the button, it can’t be appended or fling aside the artefacts.
2.2 Smart Trolley System Using RFID And Zigbee for Automated Billing [15]:
In this paper the researcher has made a system for shopping mall. In this paper they progressed a new way to do shopping. In that every item and all probable artefact have RFID badge instead of bar code. The modish cart has of RFID reader and LCD display and Zigbee communicator. In this system when a person puts any artefact in the cart it will scan the artefact and the amount and the information of the artefact will be shown on the LCD. The amount of all the artefacts will be added to the final bill, which will be stored in the microcontroller server. It will transfer information of the artefacts purchased via a Zigbee communicator to the main billing centre device. Disadvantage of the system is in Zigbee as there is distance barrier in it.

2.3 Smart Trolley and Automatic Billing [20]:
In this paper the researcher invented such a system it consists of RFID, ARM, display screen, Power supply, Switch, IR sensor, Barcode reader and Visual Basics. The system designed as it uses the bar code reader as well as RFID. After that if a patron puts any artefact into the trolley, then the artefact has RFID then the RFID reader scans the artefact or if the artefact has bar code tag, then the barcode scanner read the information of the artefact and the bill is shown on the display screen. If customer wants to discard any artefact from the cart, then there is a switch, if customer presses the switch, then the customer can remove the artefact from the cart and their shopping is done through the serial transmission the final bill is transferred to the main centre for print the hardcopy of the artefact bill. There is also provision for paying the bill by credit card. The disadvantages of the system are their uses, both the reader RFID and Barcode reader because of that the system become more difficult.

2.4 Smart Trolley with Smart Billing [21]:
In this paper the researcher invented such a system which is automatic cart with automatic billing. In that they installed the system with an automatic bill calculator will calculate and updating the customer bill when they keep the artefact into the cart. Also, patron is able to view their artefacts weight on the screen. They portrayed this paper because they have shown some features in this system like the artefact weight and information shown on screen, if artefact weight is less than stored weight then the buzzer will beep. Also, when shopping is done the patron have to press a button, then the bill calculated and shown on screen and the number of carts on the LCD and then patron have to go and take away artefact after paying the bill. If the customer wants to remove some artefact then that cancellation is done at the billing point. The new bill is generated only if the patron removes some artefact from their shopping. Drawbacks: - It is difficult to tag RFID badge to some artefacts. Here ZIGBEE is used to initiate the transmission of the cart information and bill to the centre so the ZIGBEE having a distance barrier which is a drawback.

2.5 Novel Model using Intelligent Cart for Automating Purchases [17]:
In this paper, it can be seen that the time for calculating the total bill is reduced by making a system in which customers have to scan the item themselves. That was the main reason of the paper to append utility by adding some features in the cart so that shopping process can be less time. Recent pronouncement and speculation about using near-field communication, it supports in mobile phones propound which will be additional usage for this system so that the digital and physical worlds can be combined. As coming into work for the NFC it can be used as outlined to progress ticketing and voucher services as a utility-added special events.

2.6 A Novel Low-Cost Intelligent Shopping Cart [18]:
Nowadays, if a shopper would like to acquire item at a shopping mall, shoppers necessitate to take the artefact from the showcased items and then be in line for their chance to pay the payment. Trouble will evidently be more when the number of customers in a mega mall is proportionately enormous and sometimes shoppers don’t even come to know where desired artefacts are kept. The time which shoppers have to wait for the customer in the forepart of the line to scan all probable article and then pay the bill is very difficult as it is a time-consuming task.
2.7 RFID Based Automatic Shopping Cart [19]:
Most shoppers will worry the amount they have that is not sufficient to make payment for all the items that desire to be purchased, some time they are not sure about the items they want are available in the mall or not. It will be helpful if the list of artefacts that are available in the shopping mall can be displayed. If RFID will be installed on shopping cart it will be convenient for patrons to get the information of the item and the total price of the items will be shown on a screen by which they will be able to save their time of being in the queue.

2.8 Design and initial Evaluation of a Ubiquitous Touch Based Re- Mote Grocery Shopping Process [1]:
This system is best for RFID and NFC systems. The prototype was designed for implementing the touch-based system for the customer interface. Initially group of 5 customers when given this system for using in which there were some trained some untrained. Items had RFID tag which were scanned by NFC equipped mobile phones to get the information and price of the items. Average time for shopping was noted as 40seconds whereas error rate was negligible. The survey was considered in which it was seen that most of the customers like web-based method more convenient.

2.9 LLCPS and SISO: A TLS Based Framework with RFID for NFC P2P Retail Transaction Processing [8]:
Researchers have contemplated the recognition and communication automation as well as their promotion. RFID (radio frequency recognition), mobile phones, automated billing system, and real time response have been given in this system using NFC furnish mobile phone. LICPS protocol has been used for getting the information from NFC card and to scan by mobile phones. SISO has been developed for secure payment method.

2.10 Smart Mart: IoT-based In- store Mapping for Mobile Devices [10]:
In this paper, the researchers have showcased a possibility study for integrating smartness, in items or products found in grocery stores. Internet of Things (IOT) technology have proven supportive for this as it let these products to automatically update and register their data in a storage system. Which will be helpful for the patron to locate, map and search the items on the shop using their smart phones. An Android mobile application ‘SmartArt’ is developed to showcase the ability of this introductory.

3. Components of Intelligent Cart

3.1 RFID
Active and Passive there are two classifications of Radio Frequency Identification Devices tags. Passive badges have negative battery life, whereas Active badges have battery life. Though the RFID impose of mobile automation as well as automatic recognition, automation technology is easy for modish cart [8]. With the assistance of wireless network, RFID makes the system swift, efficient and transparent which is shown in fig 1.

3.1.1 Advantages
1) This system assists in acquiring a faster bill.
2) The innovation system method reduces the long halting time.
3) Assists the patron to get the final bill information in advance, therefore they can plan an inexpensive purchase.
4) Intimate the clients about the ongoing offer by manifesting pop-up in the cart display.
5) Assists in business proportion for the super markets by achieving more clients providing quick assistance.
6) Easy in usage and doesn’t necessitate any exceptional training.
Figure 1: Showcasing usage of radio frequency while reading tags [25]

1.2 Comparison between and Barcode RFID

Comparison between barcode and RFID is given below in Table 1.

Table 1: Contrast between Barcode and RFID is given below:

|                  | RFID                                      | BARCODE                                 |
|------------------|-------------------------------------------|-----------------------------------------|
| Read Pace        | High output multiple tags may be simultaneously read. | Very low output. Badges can scan one at a moment. |
| Line of Sight    | No line of sight required                  | Required                                |
| write/Read       | to modify, write, read, and update         | Able to read article and nothing else.  |
| Capability       |                                           |                                         |
| Durability       | High. Much better protected                | Low. Can be damaged easily, not able read if damaged or dirty. |
| Reliability      | Very hard to clone. Information may be encrypted. | Low. Much easier to clone.               |
| Event Triggering | Used to trigger evident incident.          | Not capable.                            |

1.3 ZIGBEE

Communication between server and carts is done using ZigBee which is shown in fig 2. It provides low amount and less power connectivity intended for gadget that necessitate battery. So, it extends the battery lifespan of equipment [21].

Figure 2: The String of the Zigbee [26]
4. Visual abstract
A visual abstract of barcode equipped cart is shown in fig.3 and the comparison between existing and proposed system is given in Table 2 below.

Table 2: Contrast between present system and new proposed system is given below:

| Present system          | New system                  |
|------------------------|-----------------------------|
| Manual check           | Automatic check             |
| Use bar code for check | Use RFID tag for billing    |
| human personnel are necessitated for check | No necessitate of any personnel for Check |
| Low artefact amount but gross expenses are much higher | Artefact is expensive but gross expenses is much lower |
| Difficult to track the artefact. | Easy to track/locate the artefact |
| Getting artefact information is time consuming and difficult, | Getting artefact information is easy and no additional time necessitated. |
| It doesn’t disclose any self-regulating way of designate to the patron how the final check is affected as artefacts are removed or added from the cart. | LCD screen is there which will show the final bill of all the artefacts from the cart. |

5. Detail description of modish cart
The detailed explanation of suggested system is described in the coming sub section.

A) Features in Radio frequency identification device position cart
1. Bill estimation at the cart itself.
2. Low feasibility of bottleneck & carelessness.
3. Reduction in number of staffs. No more waiting lines for billing hence client’s satisfaction is improved.

B) Working of Intelligent cart
A patron invades into a shopping centre. On entering, patron first takes a cart. Every cart is accomplished with a Radio frequency identification device reader. The operation of this system is given below:
1. As the patron takes an artefact, customer first scan the RF badge of the artefact by the Radio frequency identification device reader after that keep it inside the cart. When the patron is scanning the badge of the artefact, the price of artefact is shown on mobile screen.
2. Information stored in systems survey is analogize with the database. If data is found than amount and other information of corresponding artefact gets shown on the display.
3. IR sensor for comprehensive tally. This sensor uninterruptedly releases IR rays. When customers put an artefact in a cart and at that phase there is hurdle for rays, that can result in interference in calculation of artefacts in cart. This recoded data is preserved in arm processor.
4. Counting is foremost done for safety. If someone detaches the RFID badge and puts artefact in trolley then calculating the number of artefacts assists to know information of artefact bayed. Therefore, counting is completed but no extra amount corresponding artefact in billing is done.
5. If an undesired artefact is taken out from trolley then it lessens the count of artefacts and bill. Dual entry of artefact with corresponding to amount of artefact deletes.
6. After fulfillment of shopping, customer has to press a button which designate final bill of the artefacts is generated. The final amount of all artefacts is communicated to a main device with the assistance of serial transmission and the ultimate billing is completed by VB operating system on main device.

6. Conclusion

While concluding we can propose system which all artefact in the outlet or a galleria will be fixed with RFID card on it. Every Cart have Radio frequency identification device reader and a Transmission receiver will be imposed on it. Online Transfer strategy for billing using WIFI will be provided. If the artefact is removed, item should get removed from the bill too this need to be taken care. There should be a Radio frequency identification device reader at the exit for security or anti-theft. Depending on Clients Acquiring Pattern screen can show offer/Deduction on going. It is proposed the system should show Expiry Date, Artefact Info and Alternative items. By usage of this cart, the supermarket purchase system will be effortless. Anti-theft security system for grocery market is proposed in this, which will permit online strategy for bill paying, and will provide recommendations to the patron for acquiring artefacts, exhibit offer, etc. Restriction: Radio frequency identification device tags and the ZigBee transmission should work appropriately. Using this system, it can reduce many problems faced by the customers such as patron need not have to be in long queues for billing and paying bill, searching item in the mall will be easy.

7. Coming Time work

The coming phases of this system is optimistic and continuous as it is key to cost reduction and time administration. Wireless innovative carts can be combined with Wireless Fidelity or for that event with the internet. In this way it would fortify a truly, electronic global supply chain administration and inventory administration. Moreover, the extent can be broadened even more with little changes in following ways:

1) This mechanization can be beneficial at airports as it is wireless and is capable to fortify better reliability.
2) With the appearance of innovative system, carts will ultimately substitute sales person, hence assisting in dropping final artefact of goods. By this better and more profit gain can be achieved.
3) Worldwide sales one-to-one care as well as inventory control by a structurally far off spot.

REFERENCES

[1] Ergen, S.C., 2004. ZigBee/IEEE 802.15. 4 Summary. UC Berkeley, September, 10, p.17.
[2] Han, D.M. and Lim, J.H., 2010. Smart home energy management system using IEEE 802.15. 4 and zigbee. IEEE Transactions on Consumer Electronics, 56(vol 3), pp.1403-1410.
[3] Dimitriou, Tassos. 2005 A lightweight RFID protocol to protect against traceability and cloning attacks. In First International Conference on Security and Privacy for Emerging Areas in Communications Networks (SECURECOMM'05), pp. 59-66. IEEE.
[4] P.V. Nikitin, K.V.S. Rao.A, 2006 Antennas & Propagation magazine, Theory and propagation magazine, 48, 2006, pp: 212-218.
[5] Juels A. RFID security and privacy: A research survey. IEEE journal on selected areas in communications. 2006 Feb 6,24(vol 2) pp:381-94.
[6] Hall, A.D., 1998. The fractal architecture of the systems engineering method. IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews), 28(4), pp.565-572.
[7] Kamran Ahasan, Paul Kingston 2012 IEEE paper on RFID appeals: An introductory and exploratory study. International conference on computing and control engineering (icce 2012), 12&13, modish procure experience position on RFID.

[8] Zeeshan Ali, Reena Sonkasure, 2013 RFID Position Modish Procure and Check, International Journal of Advanced Repursue in Superintend device and Divulgence Engineering, Vol. 2, Issue 12.

[9] Raju Kumar, K. Gopalakrishna, K. Ramesha, 2013 Intelligent Procure Cart, International Journal of Engineering Science and Innovative Mechanization (IJESIT) Volume 2, Issue 4.

[10] Satish Kamble, Sachin Meshram, Rahul Thokal, Roshan Gakre 2014 Progressing a Multitasking Procure Cart Position on RFID Mechanization, International Journal of Soft Computing and Engineering (IJSCE), Volume-3, Issue-6.

[11] P. Chandrasekar and Ms.T. Sangeetha 2014 Modish Procure Cart with Automatic Check Replica through RFID and ZigBee, IEEE.

[12] Rong Chen, Li Peng, Yi Qin, 2014 Supermarket Procure Guide Replica Position on IOT IEEE Chronicle.

[13] Vrinda, Niharika, 2014 Novel Replica for Automating Toeholds manoeuvre Intelligent Cart, Vol 16, Issue 1, Ver. VII, pp: 23-30.

[14] Galande Jayshree, Rutuja Gholap, Preeti Yadav 2014 RFID Position Automatic Check Cart, International Journal of Emerging Mechanization and Advanced Engineering Volume 4, Issue 3.

[15] P. Chandrasekar and Ms.T. Sangeetha 2014 Modish Procure Cart with Automatic Check Replica through RFID and ZigBee, IEEE.

[16] Vrinda, Niharika, 2014 Novel Replica for Automating Toeholds manoeuvre Intelligent Cart, Vol 16, Issue 1, Ver. VI, pp :23-30.

[17] Rupali Sawant, Kripa Krishnan, Shweta Bhokre, Priyanka Bhosale2015 The RFID Position Modish Procure Cart, International Journal of Engineering Repursue and General Science Vol 3, Issue 2 pp: 275-280.

[18] Kalyani Dawkhar, Shrippendha Dhomase, Samruddhi Mahabaleshwarkar 2015 Electronic Procure Cart for Effective Procure position on RFID, International Journal of Innovative Repursue in Electrical, Electronic, Instrumentation and Control Engineering Vol. 3, Issue 1 pp: 84-86.

[19] Parvathy, A., Venkata Rohit Raj, Manikanta Venumadhav, and M. Chaitanya. 2011RFID based exam hall maintenance system. IJCA Special Issue on “Artificial Intelligence Techniques-Novel Approaches & Practical Applications” AIT.

[20] Ekta Maini and Jyoti Shettar 2014 Wireless Intelligent Billing Trolley for Malls, International Journal of Scientific Engineering and Technology Volume No.3 Issue No.9, pp: 1175-1178.

[21] Sawant, Ms Rupali, Kripa Krishnan, Shweta Bhokre, and Priyanka Bhosale. 2015 The RFID based smart shopping cart. International Journal of Engineering Research and General Science 3, no. 2 pp:275-280.

[22] Kalyani Dawkhar, Shrippendha Dhomase, Samruddhi Mahabaleshwarkar Electronic Shopping Cart for Effective Shopping based on RFID, International Journal of Innovative Repursue in Electrical, Electronic, Instrumentation and Control Engineering Vol. 3, Issue1 pp: 84-86.

[23] Janhavi Iyer, Harshad Dhabu and Sudeep K. Mohanty, 2015 Smart Trolley System for Automated Billing using RFID and ZIGBEE, International Journal of Emerging Technology and Advanced Engineering, Vol 5, Issue 10.

[24] Dr. V. KarpagamA, S. Balapriya B, G. Kalairubini C, A. KalaivaniD 2017 Automatic Trolley with Automatic Bill, IJIRST, Vol 04, Issue 03.

[25] https://www.textile-id.com/how-rfid-drudgerys-in-textile.

[26] https://environmentalengineering.org.uk/news/the-sting-of-the-zigbee-1835/.