Smart Shopping Trolley with Automated Billing

Harsh Bhadra[1], Hemal Nakrani[2], Jay Patel[3], Shekhar Pachupate[4]

[5]Project Guide: **Mr. Ganesh Wadmare**

[1-5]Department of Electronics Engineering, K.J.Somaiya Institute Engineering and Information Technology, Sion.

Abstract: The various items are purchased in shopping mall or markets with help of shopping trolley. Product acquirement in shopping mall is some difficult process. In customer convenience they have to pull the trolley and add product to the shopping cart simultaneously. After purchasing, customer have to pay the bill for their purchased items. In that time, they have to wait in a long queue to get their products scanned using barcode with help of barcode Scanner and get their bill generated. To modify that customer has to purchase in smart way in shopping mall. Each and every product has a RFID tag that has to be scanned to get the product information using RFID reader. The smart trolley will consist of a RFID reader, LCD display and ZigBee transmitter. When customer wants to buy any product, he will scan RFID tag and the product information like name and price will be transferred to computer. The total cost of all the purchased products will be added to the final bill, that final bill will be saved in the Arduino and will be sent to main billing counter with the help of Zigbee module. These are all performed in the transmitter side. In receiver side, it is wireless transmitting process.

1. INTRODUCTION

Mall and market is a big corner for customer to purchase the daily requirement like branded food item, snacks, cloth materials, electric and electronic devices etc. Nowadays, a maximum numbers of shopping mall are available, large as well as small in the world. During holidays and weekend time we can see a huge rush at mall. The public now a days spends more time in shopping mall. After purchasing for a long time, the customer's wastes unnecessary time at the billing counter for billing of the purchased item. Continuous improvement is compulsion in the common billing system to increase the quality of shopping experience to the customers. To overcome these problems and to change and improve the existing system, we have designed a SMART SHOPPING TROLLEY. This can be done by simply using RFID tags instead of barcode for the products and a RFID reader with a LCD display on the shopping trolley. In this system, customer will have to know the price of each and every item that is scanned with the help of RFID and LCD, total price of the item will be displayed in LCD and also shows brief information about the product. In this system will save time of customers and manpower required in mall. It is also used to reduce the employee work in the shopping mall.

2. LITERATURE REVIEW

People have consistently imagined and built up an innovation to help their needs as far back as the start of humanity. The fundamental reason for headway in innovation has been in limiting errands and making regular tasks simpler and quicker, regardless of the different spaces accessible. A significant task on which people are discovered spending significant measure of time is shopping. For this at start we used barcode system but after some years it also started to have issues like LOS (line of sight), increasing queue etc. so overcome this issues a concept of smart trolley with RFID technology was proposed

a. Use of IOT:

The implementation of IOT (Internet of Things) [4 5] based automated trolley system was reported in [1]. Framework is utilized to ease lines in shopping Centre by utilizing RFID module. The RFID reader will peruse the RFID Tag set on the item when the item fall in the trolley. In the event that, the client needs to expel any item then he should expel that item from the trolley. The LCD will show the subtleties of the expelled item like name, cost and the absolute bill and with the help of Xampp server the bill will be send to thecashier.

b. RFID Tags:

Paper[3] designs a shopping cart by taking inspiration from a shopping basket which is under development by Panasonic, in which each item is tagged using UHF RFID [range: 916-924 MHz] Two Circular Polarized (CP) Patch antennae used to read RFID tags in different orientations. They also include a factor for measuring effectiveness of function called as RSSI (Return Signal Strength Indicator) RSSI measurement plays a significant role in this smart trolley application as RSSI measurement indicates the directional gains that are needed for the antenna development. CSL468 RFID reader used having 16 ports and scan speed of 300 tags/sec. [4] proposes a cart to provide billing Paper services using a combination of RFID and Li-Fi (Light Fidelity) systems. However, both are not used together. An option is provided at the beginning, when the trolley is put to use by the customer, to

choose whether to use RFID or Li-Fi for scanning purposes.This system uses Arduino Uno Atmega328 microcontroller along with RFID module (tags and reader) and Li-Fi transmitter and receiver. If RFID option is chosen, the RFID reader is activated and on adding items into the cart, RFID tags are scanned. Otherwise, on choosing Li-Fi option, Li-Fi receiver is activated.

c. ZigBee Module:

Paper [6] describes a shopping cart which uses the ATMega microcontroller to carry out various functionalities and the connections are made to ZigBee technology, power source, EEPROM and display unit. ZigBee network provides low cost low power connectivity for equipment that needs battery life long for several months. RFID reader is technically used to provide a unique id and mostly used to electronically record the items and information related to object using radio signals. A central automated billing system has been assigned where all data is gathered according to their personal identification device, via ZigBee communication. There the net calculations are done. Customer can get their billing details via their unique cart number

d. RFID Scanner:

In Paper[7] the authors proposed an automatic billing system by means of a smart cart which comprises of an RFID reader which will read the products containing the RFID tags when put into the smart cart, hence ensuring an auto-billing process for customers and the payment can also be done through mobile application. Radio Frequency does use signals to identify signals and objects.it reads information form a long distance as there is no line of sight so there is no need of any physical contact. Tag than does create disturbance which is responded by decoder. A far-field antenna uses capacitive coupling to charge the RFID tag. Capacitive coupling occurs when the RFID reader's antenna propagates RF. Now here two types of RFID are available they are passive and active .Passive tags don't have an internal power source where active tags do work on battery. The electromagnetic field that surrounds an RFID antenna can be broken up into two segments – near-field and farfield.

3. IMPLEMENTATION

At first the customer goes into the mall and takes the SMART SHOPPING CART which will be equipped with an RFID scanner. Then he/she must shop as he/she does regularly. While the customer will be shopping, RFID scanner assembled on the cart will be generating the invoice simultaneously. Whenever the customer adds an item with RFID tags into the cart, the cart recognizes it and adds in the billing section. In this way, whenever the customer will add or remove anything the scanner will detect this, and accordingly the invoice w

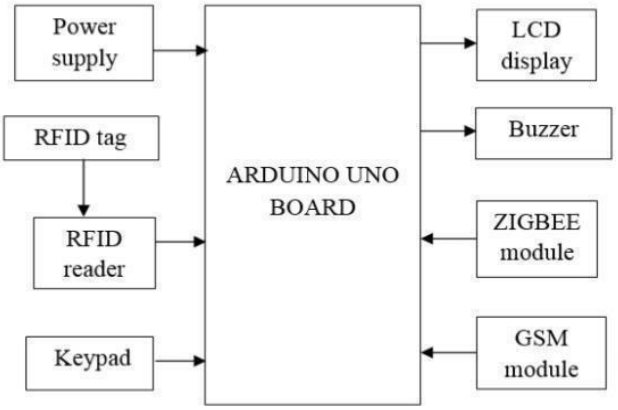

Fig 1. Block Diagram

Now various methods are used to scan the RFID tags. Some are using ATMEGA32 microcontroller, Em18 module and one of the best is RC522. Like scanning has these many options generating the bill and sending it to the cashier has also many options like we can use Xampp server, ZigBee module. Some of these technologies have been used while some are still in experimental phase. So basically what this project does is that it enhances customer shopping experience. The bill is generated simultaneously, so you need not stand in a queue, waiting for people in front of you to unload their items so that the cashier could scan them and generate invoice. Also when the bill is being generated, you can keep track of your budget and by this you can also save money and time

4. RESULTS

The results produced by our project is that when we scan RFID tag of particular products to add that item in Shopping Cart all the details of the product. Like name weights and cost etc. while be transferred to the Arduino and the price of the product will be added to the grand total. When customer needs to remove a particular products he/she will have to scan RFID tag of that product again, the product will be removed from the list as well as grand total.

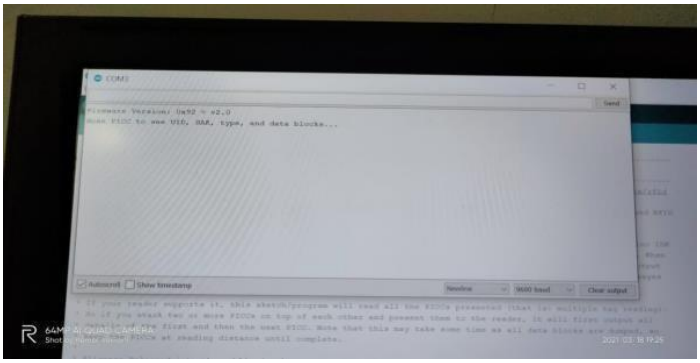

Fig 2. RFID is searching for RFID tag

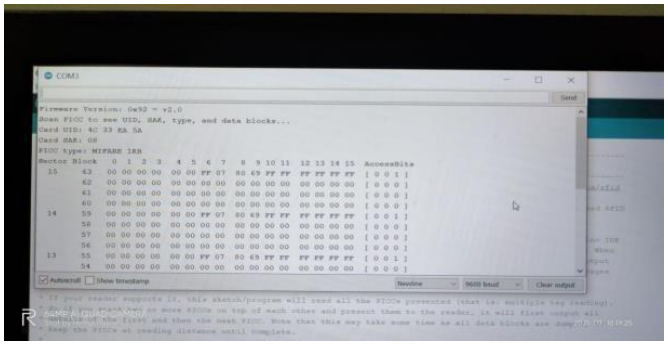

Fig 3. RFID tag is detected

5. CONCLUSION

According to customer's point of view, this project has redefined the way of purchasing. Evidently RFID has outsmarted barcodes by its accuracy, fast response and durability. This concept has erased the tradition of customer relying on the shopkeeper fort acquiring information about products. Billing is completely avoided which in turn saves time for the customer and makes process easy for shopkeeper. It avoids queue for customer since billing is completed in the trolley. It reduces one third of the overall investment of the shopkeeper for billing department.

6. REFERENCES

[1] Ms.Priyanka S. Sahare, Mr.Anup Gade , Mr.Jayant Rohankar A Review on Automated Billing for Smart Shopping System Using IOT International Information and engineering technology association 20 December 2018

[2] Mr.Gaikwad Prerna, Ms.Nita R. Mh aske Smart Billing Trolley Using RFID And LIFI International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 6, Issue 9, September 2017.

[3] Mr.Tharindu Athauda, Mr.Juan Carlos Lugo Marin, Jonathan Lee, Ms.Nemai Karmakar Department of Electrical and Computer Systems Engineering Robust Low-Cost Passive UHF RFID Based Smart Shopping Trolley IEEE Journal of Radio Frequency Identification DOI 10.1109/JRFID.2018.2866087

[4] Mr.Dhumane, A., & Mr.Prasad, R. (2015). Routing challenges in internet of things. CSICommunications.

[5] Mr.Dhumane, A. V., Prasad, Mr.R. S., & Prasad, J. R. (2017). An optimal routing algorithm for internet of things enabling technologies. International Journal of Rough Sets and Data Analysis, 4(3), 1–16.

[6] Mr.P. Chandrasekar, Ms.T. Sangeetha Smart Shopping Cart With Automatic Billing System Through RFID And ZigBee CICES2014 - S. A. Engineering College, Chennai, Tamil Nadu, India

[7] Ms.S. Aishwarya, Mr.D. Gomathi Shankari, R. Ilakkiya, S. Prasanth and Mr.S. Sri Heera, Smart Supermarket Trolley System Using RFID Department of Computer Science and Engineering, Easwari Engineering College, Chennai, India International Journal of Trend in Researchand Development, Volume 5(2), ISSN: 2394- 933