SMART SHOPPING TROLLEY

Prof. Harshada Magar, Dipesh Devali, Sarvesh Diwane, Shubham Jadhav

hmagar15@gmail.com
dipeshdevali.293@gmail.com
dsarvesh27@gmail.com
jadhavshubh3@gmail.com

Department of Electronics and Telecommunication,

AISSMS IOIT, Savitribai Phule Pune University, Pune, Maharashtra, India – 411001
AISSMS IOIT, SPPU, Pune, Maharashtra, India.

ABSTRACT

Grocery shopping is one of the activities among the shopping.According to the research most people prefer shopping at malls and shopping centers rather than traditional markets.In holidays and weekends there is huge rush at malls, which creates long queue at the billing counter due to existing system .At the billing counter customer faces problems like wastage of time. Smart Shopping Trolley is developed for people in daily purpose shopping by including some automation techniques by traditional methods. It will create convenience to the individual for the shopping purpose. The objective is to provide effortless shopping at the least cost. This system will have following modules : (i) System Assets (ii)Tag removal Detection(TRD) iii) Amount Limit Setter(ALS) and (iv) Centralized Biller(CB) .System assets are used to identify the product placed in shopping cart using RFID technology and show the cost and total bill on LCD. If a person wishes to remove the product then the person can do that using TRD. Amount limit setter (ALS) helps to set the budget if cost exceeds the expenditure limit a buzzer will turn ON. Centralized Biller will create the total expenditure as the cart proceeds to the centralized counter through Zigbee transmitter. The main aim of this project is to provide effortless shopping experience while shopping at the supermarkets.

Keywords— Radio Frequency Identification (RFID), Liquid Crystal Display(LCD), ZIGBEE

ARTICLE INFO

I. INTRODUCTION

Today technology has a very important everywhere. There is always a development in technology to fulfils the needs. The shopping section plays an important part in today's generation. Now a day's most people goes for shopping and buying things on weekends especially on holidays. Various problems are currently faced by the customers while shopping. One has to keep worrying about the amount they had brought whether it will be within their limit. The present scenario is that usually a person comes with a list of required products, while shopping he selects the product among different brands depending upon details he get after reading on the pack or the feedback. When all required products are placed into cart the person moves towards billing counter where he may have to stand in a long queue to pay the bill depending upon the rush in mall, unnecessarily wasting valuable time. The rush is even more during the special offers and discount; in this case a lot of people tends to avoid shopping . This should be changed with the use of technology. There is need to bring some advancement and automation in this on going practice so everyone can feel easy and comfortable while shopping even if there is huge rush. In the traditional system there is still scope of improvement. This paper contributes to the advancement in the existing shopping system which can bring a new innovation in the field of shopping malls. The purpose of this paper is to provide automated and centralized billing system using RFID which will replace traditional system of shopping. Budget setting has also been incorporated in this system.

II. LITERATURE SURVEY

Taken into consideration of the problem of present shopping scenario following are some proposed model for the same, Zeeshan Ali, Prof. Reena Sonkusare in "RFID Based Smart Shopping and Billing" [1] proposed that the developed system comprises of Cart location detection unit (CLDU),Server Communication unit (SCU), User Interface and display unit (UIDU) and Billing and Inventory

management unit (BIMU). CLDU is used to smartly locate the position of shopping cart inside the shopping market to help in obtaining relevant product information. SCU will help in establishing and maintaining the connection of the shopping cart with the main server.

Prasiddhi K, Dhanashri H, Gawali in "Innovative shopping cart for smart cities" [2] proposed provision for budget setting which is truly beneficial. Customer will come to know about the ongoing offers and details of products so it will become easy to choose a healthful and beneficial product.

Mr.P. Chandrasekar and Ms.T. Sangeetha in "Smart Shopping Cart with Automatic Billing System through RFID and ZigBee" [3] proposed that the application creates an automated central bill system for the mall. Customers can pay their bill through credit/debit cards. Zigbee and RFID used for in it

Ezhilazhagan, R. Adithya, Y. L. Burhanuddin and F. Charles in "Automatic product detection and smart billing for shopping using Li-Fi" [4]has features incorporated automatic product detection and smart billing with the help of Li-Fi technology. The payment is processed through mobile banking or cash payment and the cart system will verify the products and complete the process successfully.

Y. C. Wang and C. C. Yang, "3S-cart: A Lightweight, Interactive Sensor Based Cart for Smart Shopping in Supermarkets," in IEEE Sensors Journal [5] uses the context aware ability of sensors to detect the behaviour of customers and respond to them in real time.This system finds the customer interest and a shortest path to comfortably obtain the desired product.

III. PROPOSED SYSTEM DESIGN

As shown in the Figure 1. the block diagram of device which will be attached to the shopping trolley. The device will consist of Raspberry Pi, LCD, an RFID reader, keypad, buzzer, Zigbee device. A 16x2 LCD will display the details of product recently added and total cost which will help customers to know about the product. Using 4X4 keypad matrix one can set the budget. If the cost of product exceed the limit then buzzer will buzz which will let the person that it had exceed the limit. If the person want to remove the product from the cart he can do it using switch.

There are various models in the block diagram where all the blocks is studied with specifications for each individual block. Selection criteria depends on requirements of system which will satisfy the needs and can be implemented in low budget.
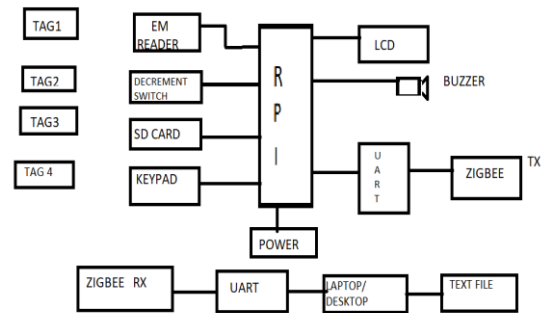

Figure 1. Block Diagram of the proposed system.

The unit in the block diagram will be mounted on the shopping cart. It will scan the products and memory display on LCD. This section deals with transmission of data from shopping cart to centralized billing counter. At the receiver end using Zigbee the transmission of bill from LCD will be transferred to central billing unit. After the person completes his shopping he will move toward the billing counter along with the cart. As soon as the trolley is at the billing counter the data is transmitted from the trolley to the central billing unit using Zigbee.

Proposed system will also consists of some features such as budget setting which will be very useful.This system will reduce the long queue at the billing counter which will save the customers time.

A. Microcontroller

Raspberry Pi 3 is the main component which is used as microcontroller in the system. Advantage of using RPI3 over first generation is speed of operation and various inbuilt functions. Inbuilt functions like wireless LAN and Bluetooth Connectivity makes raspberry Pi best solution for many connected designs. Power is supplied through 5.1V micro USB supply. Raspberry Pi 3 works on 700-1000mA depending on external devices connected to it. 2.5Amp is the maximum power requirement for Raspberry Pi3.

Component Specifications:

- It consists Broadcom BCM2387 chipset.
- 1.2 GHz Quad Core ARM Cortex- A53.
- 2 Gigabytes Random Access Memory.
- It has 64 bit CPU.
- 4 Universal Serial ports.
- Full Size HDMI.
- CSI camera port.
- 40 pin GPIO.

RFID Reader

The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors

.RFID reader is the main part of the system. Using the transmission pin of the reader it will send it to the Raspberry Pi. It's perusing ability changes from 6cm-3m relying upon tag, reception apparatus and usage. It has a most extreme information rate move of 10Mbps and has a present utilization of 13 to 26mA.It can also operate on low power.

RFID Tag

There are two categories of RFID system – Active and Passive. Active RFID systems have their own power and transmitter source emitting their own signals to transmit the information stored in microchips. There is no need of line of sight and multiple tags can be read simultaneously with a good ability to read, write, update and modify the data.

Uninvolved labels are otherwise called Battery less labels. Cost per each tag may differ not many pennies to ten or twenty Euros relying upon recurrence, structure factor, bundling and so on. They do not have any in-built power do not have any in-built power supply and are driven by the energy given from the RFID Reader. Cost of tag makes it more inexpensive and easy to use.

Zigbee Module

RFX240 is minimised to a greater extent to supply all suitability of transfer of power intensification for IEEE 802.15.4b/g/n implementation in the 2.4GHz frequency range.It produces a gain of 30db and a range of +26dbm of linear output power with low EVM of less than 3percent for 802.15.4 n MCS7 HT40 signals. Since it make less outward use of element it makes it easier for the RF Front end implementation.

In this project we have used two zigbee one connected to the USB port of Raspberry Pi and other one from the USB port to PC which acts as Central billing unit.

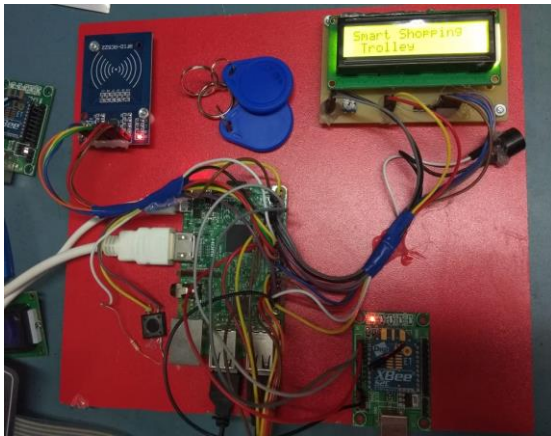### III. SYSTEM IMPLEMENTATION

The proposed framework will be actualized into two phases .First stage is tied in with instating the Raspberry Pi for the setting up of RFID Reader and Zigbee. Second stage will have the tag recognition process of the products by RFID Reader; position of RFID reader is on top of cart so that reader will scan the tag at the time of product insertion and processor will be able to send item data from trolley to Central biller unit utilizing Zigbee innovation. The overview of working of system is briefly explained further - This proposed system is customer oriented service. Every cart will have a assembly of RFID reader , power unit microprocessor and LCD screen. Every product will have a RFID tag which contains the information of that particular product, whenever customer wants to include any product to the cart, RFID tag will now be available to RFID reader which is placed on costumer's trolley ,now tags will be read by the reader and this information will be made available for further algorithms. the reader will send the processed data to the central server unit via Zigbee transmitter. The information from RFID reader will be compared with the information stored in the memory of the processor . In the event that the information gets coordinated, at that point the expense and name of that

item will be shown on the LCD for the client . On the off chance that the client needs to expel any item from the trolley, at that point item can be expelled using revers algorithm, due to the removal of the product cost of that specific item will be concluded from the aggregate sum determined till now and after shopping the summery of cart, status of cart will be transmitted through Zigbee to the central Billing center . Figure 1. represents the block diagram of entire system in which reader is connected to Raspberry Pi which will be further gets connected to LCD and Zigbee which then send to central biller unit. This complete process is explained in following flow-chart shown in Figure 2. Testing of this system is done and results obtained are put in the next section.
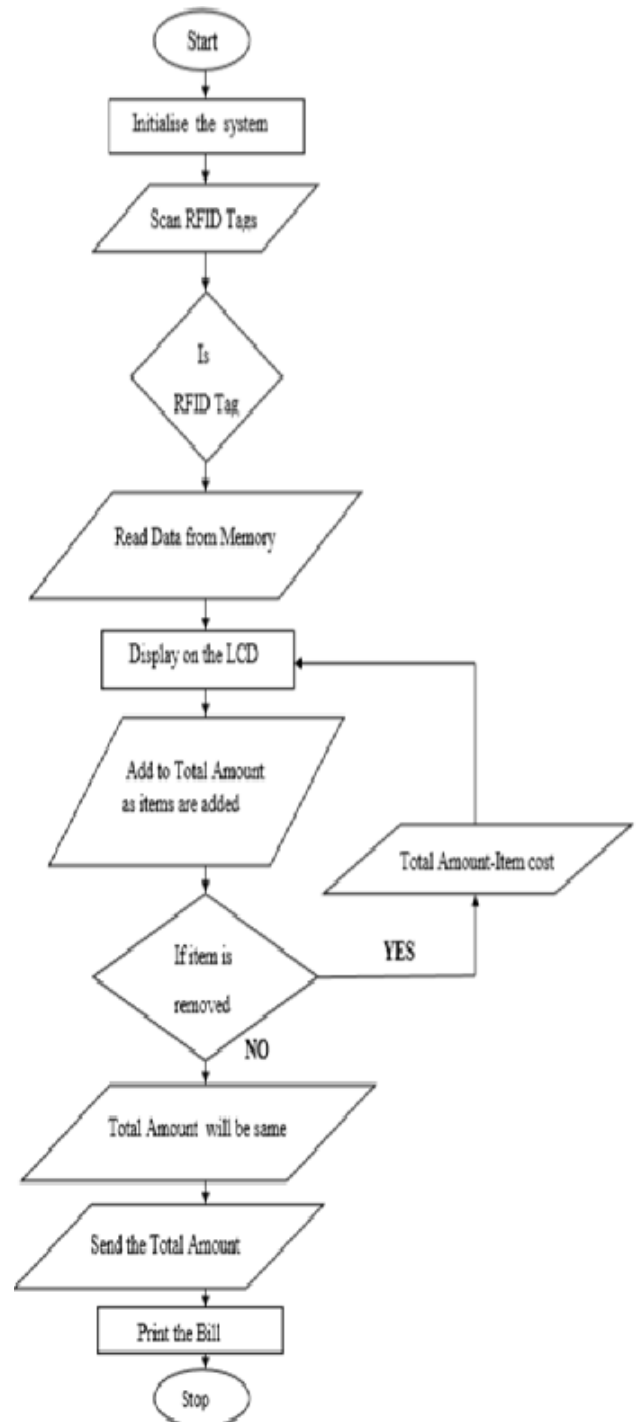
IV. TESTING AND RESULTS

- Through tests and analysis RFID tags placed on products are detected successfully by RFID reader.

- Algorithm used for calculation of bill is working without errors.

- Algorithm for creation of invoice can be done successfully.

- Display of final amount and cart scenario using LCD.

V. CONCLUSION

In this paper a successful implementation of smart, advanced, methodical and low cost system to make shopping more convenient and user friendly. For real time application it will be very dependable system. RFID technology is replacing other asset tracking technologies due to its high working efficiency with assurance of security. Thus this system has successfully achieved goal of amount limit setting, product recommendation, include and deduct cost of item as per the condition when item is kept in trolley and taken out separately.. The centralized biller has successfully received data through Zigbee and generated full invoice of cart scenario.

REFERNCES

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

[2] Prasiddhi K, Dhanashri H, Gawali, "Innovative shopping cart for smart cities", 2017 2nd IEEE International Conference On Recent Trends in Electronics Information & Communication Technology (RTEICT), May 19-20, 2017.

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

[4]. Ezhilazhagan, R. Adithya, Y. L. Burhanuddin and F. Charles, "Automatic product detection and smart billing for shopping using Li-Fi," 2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, 2016, pp. 1723-1726.

[5].Y. C. Wang and C. C. Yang, "3S-cart: A Lightweight, Interactive Sensor Based Cart for Smart Shopping in Supermarkets," in IEEE Sensors Journal, vol. 16, no. 17, pp. 6774-6781, Sept.1, 2016.