



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 Issue: V Month of publication: May 2020

DOI: <http://doi.org/10.22214/ijraset.2020.5332>

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Design of an Embedded High Efficiency Smart Trolley

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Abstract: Nowadays, in big cities searching and buying things has become a daily activity. On holidays and weekends we see a crowd and huge rushes at malls. In malls or supermarkets shopping trolley is a necessary tool for shopping. Customers purchase the things and place them in trolley. After purchasing all the items which are needed the customer needs to pay the bill in cashier. Here the customer has to be in a queue for payments and to wait in the queue. And this paper mainly focuses on to minimizing the Queue at billing counters in malls or supermarkets. When the trolley number is entered in cash counter, the smart trolley will detects the all the items present in the trolley. Each item will have RFID tags/readers attached to it which reads the name and also price information of that item. This hardware system is connected using Bluetooth. The shopping speed will be increase cause of this smart trolley because this system will eliminates the products scanning at the counter and also the buyer/customer will know the total price to be paid through the display that is present in the trolley. And hence the customer shall buy the products as per his/her budgets and savings. Since all these billing is automated the human errors are eliminated. Also the system has a feature to remove the scanned items incase customer doesn't need it.

Keywords: RFID tag and reader, LCD display, Bluetooth module, Switch array, Regulated power supply board.

I. INTRODUCTION

Nowadays people buy more in malls or supermarket for their satisfaction needs. And shopping mall is a place where all the necessary items will be available at one place. Even human lifestyle has changed. Time has become more important. People hate spending much time on shopping where time has become money. Shopping in malls has the benefit of saving time; they have only weekends to visit shopping mall. Therefore there will be a huge crowd of customers on holidays. So they have to stand in queue for long time. So they

use trolley to carry the items. After shopping the customer has to be in a long queue for paying the bills and ant the billing counter they need to use the barcode reader which takes time for billing process. This smart trolley will help to detect the all total products/items list when the trolley number is given in cash counter. Each and every item will be having RFID tags/readers which makes easy to detect.

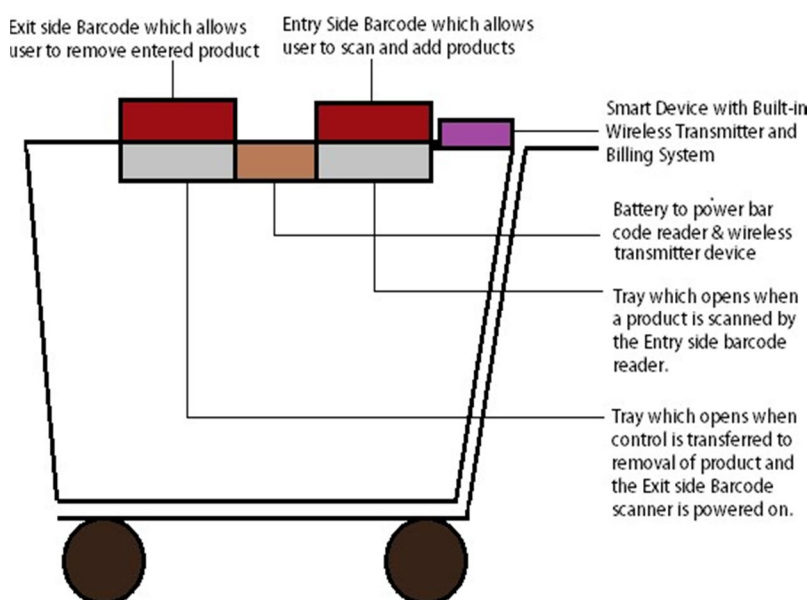


Fig.1. Barcode Trolley

II. PROPOSED SYSTEM

The proposed system is highly authentic, dependable, trustworthy and time-effective. Smart trolley detects the total price and the list of the items/products when the trolley number is given in billing centre. Each and every product is attached with the RFID card/tags so that all the products/items are detected. When the customer put the required product in the trolley, the RFID Reader will reads the cost of the items/product along with its information such as name and other given details. And this hardware system is connected via Bluetooth and also this system will make the billing procedure very simple.

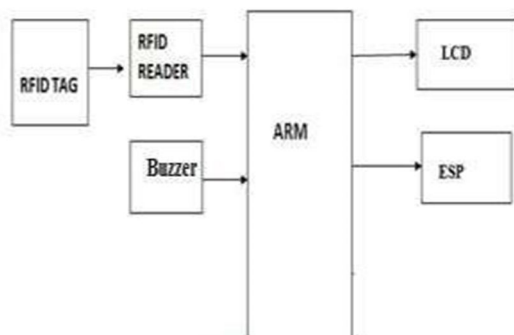


Fig.2.Block diagram of Transmitter.

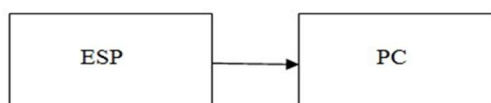


Fig.3.Block diagram of Receiver.

III. SYSTEM OBJECTIVES

Main objective of this system is to reduce the waiting time in queues during payments in supermarket so that there will be improved shopping experience. And also this trolley can calculate the total amount of shopping automatically which also displayed on the LCD so the customer can know the amount before which improves the security and speed.

IV. ARCHITECTURAL DIAGRAM OF PROPOSED SYSTEM

In smart trolley, all products/items are attached with RFID tag. When we go to supermarket, we have to read that trolley using RFID. Secure and shopping cart are used to store the items with RFID which will calculate the bill amount automatically and this amount will be displayed the LCD. RFID scanners are used to check and verify all the stocks. Through web application the admin can handle the stocks which are sold. And also the remove button is used to remove the items which are not necessary.

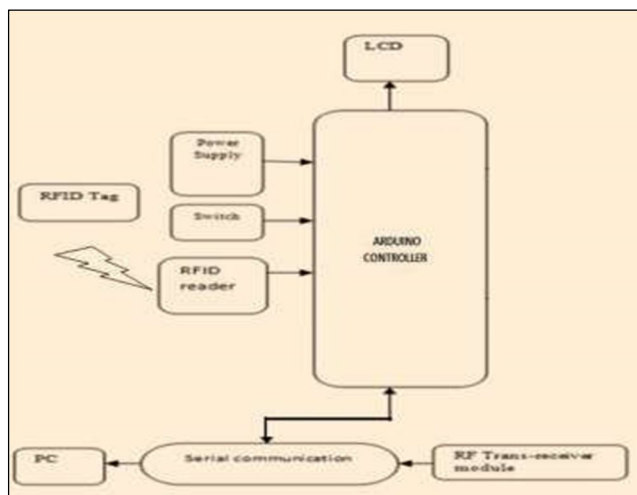


Fig.4.Architectural diagram of smart trolley

V. INTERFACE

A. Hardware Interface

A. *Mobile Devices*

The mobile devices like smart phones and also LAN networks are hold by this external hardware interface.

B. *RFID Reader Module*

RFID reader which reads tags that is used to track the individual objects, these are used in RFID scanner module.

C. *Operating System*

This product will work with Android 2.1 and above.

D. *RFID Card*

A radio frequency identification reader (RFID reader) is a device used to collect data from RFID tags that is used to trace single or separate objects.

VI. FLOW OF THE APPLICATION

- A. Each and every item in the supermarkets will be attached with RFID tags. RFID reader will scan the products when the product is placed in the trolley.
- B. The name and price of the items name ,cost and other information will be read by the RFID Reader which sends its code further to Arduino Uno.
- C. Whenever we add the products to trolley, the price of products will be added to total. Simultaneously all information will be displayed in LCD. And also products amount can be subtracted when it is removed from the trolley and removed product will be displayed in the LCD.
- D. RFID tags are having small chips which are attached to an object. This RFID tags and Reader communicate in wireless mode. The data are passed through the chips. As this RFID reader emits a low power radio emission field.
- E. LCD is interfaced with Arduino Uno. We use LCD to show or display the action by customer like inserting of an item, removal of item, item's value and total request value of things in the trolley.
- F. At last the cash is collected at billing counter where the admin or owner counts the total number of products and collects the cash from the customer.

VII. FUTURE WORK

The future implications of the proposed system are very promising considering the amount of time and resources that it saves. The transaction and billing system can be linked with bank account of individual user to make direct payment provided that security issues are being taken care of. Also, the trolley can be further designed to search products in shelves and guide the user accordingly to the position of the exact product. Grocery shopping is one of the most fundamental everyday activities. For most customers a shopping list is an integral part of the shopping experience. We can usually find people going to the malls in order to get items in bulk. Hence our project smart trolley is designed where customers can buy any number of items and can drop it to the smart trolley .The complex procedure of counting the items in the trolley will be reduced since the RFID is attached to each system. Hence reducing the work of customers as well as shopkeepers. In future this project can be implemented by adding more modules and also an android or ios system can be developed.

VIII. CONCLUSION

In this paper we tend to modify the billing process and also increased the protection. It avoid queue for customer since billing amount is already shown in the LCD which makes customer happy and saves his/her time. Here the trolley automatically calculates the cost of all the items and also the total amount is show in the display which is main features of this system. By this it helps the customer pay during shipping easily. And also remove button helps to remove the items just by clicking on it. In future this intelligence system will advise the customer which product can be removed from the trolley if budget is exceeded. The proposed system is highly authentic, dependable, trustworthy and time-effective.



IX. ACKNOWLEDGEMENT

We would like to offer our sincere thanks to our guide Assistant Professor Mrs. Aishwarya K., Assistant Professor, Srinivas Institute of Technology.

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