AUTOMATIC SHOPPING TROLLEY FOR BILLING SYSTEM USING RFID

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Abstract – An automatic smart shopping trolley is formed by introducing the concept of RFID(Radio Frequency Identification) to connect all items in the grocery shops or malls. In this system, an inexpensive RFID tag is embedded within each product. When the product is placed into a smart cart, the product detail is automatically read by the cart equipped with an RFID reader. Hence, billing is made from the shopping cart itself preventing customers from waiting in a long queue at the checkout. Also, the product's expiry date is displayed and the damaged product is identified automatically concerning its weight. Thus, the expired product will not be considered for further billing calculations. However, there are shopping trolley is abandoned everywhere in supermarkets after being used. Therefore an automatic human and line following shopping trolley with a smart shopping system are developed to solve this problem.

Key Words: RFID tag, RFID reader, smart cart, smart shopping, smart card, Human following, Line following, LCD, sensors, weight machine.

1.INTRODUCTION

Shopping is simple but waiting at a bill counter makes shopping too boring and an uninteresting task. A huge amount of rush plus cashier preparing the bill with a barcode scanner is to time- consuming and results in long queues. This innovative project consists of an automated billing system that can be placed within the shopping trolley. This automated payment system consists of an RFID reader which is controlled by Arduino. So, whenever the shopper puts any product in a trolley it is detected by the RFID module and is displayed on an LCD screen along with the price of the product. As the shopper goes on adding products, all products are detected by the module and therefore the price will increase accordingly. In case if customer changes their mind and doesn't want any product added to the trolley then they can remove it and the price added will be deducted automatically. At the end of shopping, the shopper will press the button which when pressed adds all the product along with their price and gives the total amount to be paid. At the exit for verification, the shopkeeper can verify the products purchased with the help of a smartcard. Hence this technique is an appropriate method to be used in places like supermarkets, this will help in reducing manpower and helps in making a better shopping experience for customers.

2. LITERATURE SURVEY

A currently available method in shopping malls is the barcode method. In this method, there are barcode labels on each product, which are read by a barcode scanner. A barcode reader in a device consists of an LED lights, a lens, and a light sensor translating optical impulses into electrical ones. At the billing counter, the cashier scans the product through the barcode scanner and gives us the bill. But this results in a time-consuming process and thus it leads to a very long queue.

RFID technology is found to be very much conventional than barcode technology. It is possible to read RFID tags from a longer distance. An RFID reader can access the information of the tag from a distance of around 300 feet, whereas barcode technology cannot be read from a distance of more than 15 feet. RFID technology also scores over barcode technology in terms of speed. RFID can read and write data simultaneously whereas barcode cannot. Barcode reading is comparatively slower because it requires a direct line of sight. The Barcode reader can read only one tag whereas RFID can read multiple tags at a time.

RFID tags are well protected and hence are not subjected to too much wear and tear. Barcode is printed on the outer side and is thus subjected to greater wear and tear. As barcode lacks read and write facility, it is not possible to add the information which is already existing on it.

3. PROPOSED SYSTEM

The proposed system consists of the following sections :

a) Trolley Section
b) Master Billing Section

As shown in fig 1, the smart trolley system architecture involves two sections as embedded and java. In the embedded section, a microcontroller is used to coordinate with the RFID reader, weight scanner, and LCD touch screen, GSM/GPRS module to perform computing functions. Via serial communication, the information is passed to the GPRS module then under the Java section, the data is retrieved and viewed on the website using cloud access.
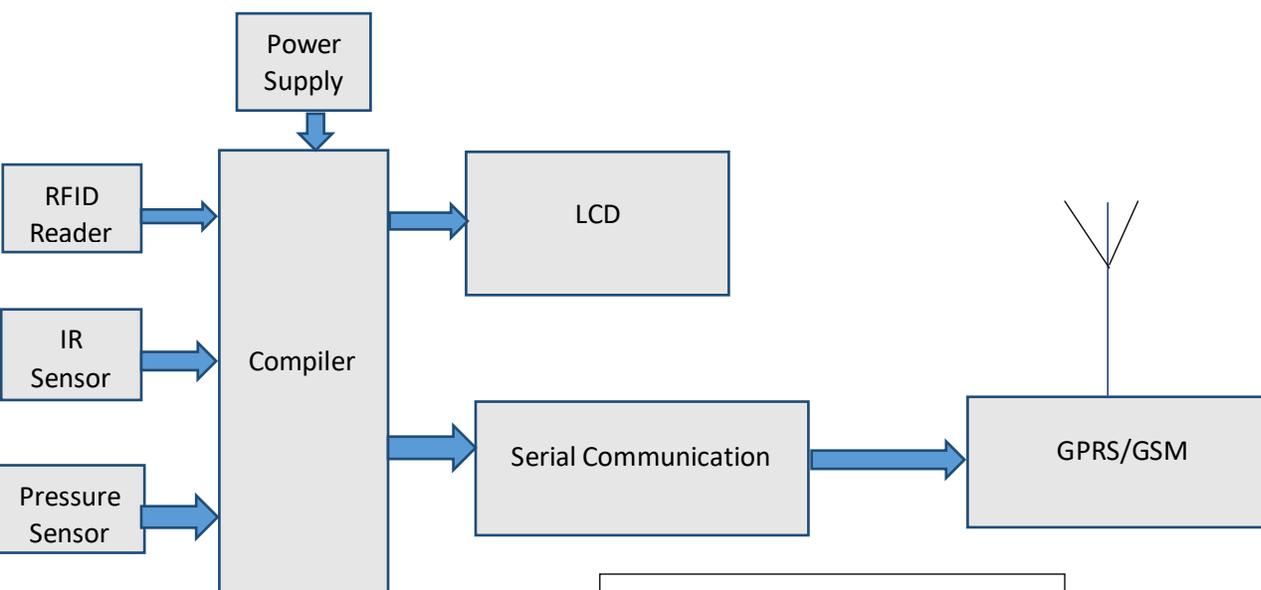
FIGURE 1: System Architecture

4. WORKING

- Registration: Before moving all items to the shelves, the store needs to register all of them. Information such as price, location, and coupon is stored in a database of the server, rather than tags because such information might change over time and it is more convenient for the server to manage them. Tag is composed of product name, number weight, expiry date.

- RFID Tag Scanning: RFID tags are used to identify and locate items using radio signals. They consist of a microchip and an antenna that transmits a signal to a reader.RFID tags can be read out of the line of sight and at distance ranging from a few centimeters to over 100 meters. They also enable individual items to be given unique identification numbers.

- Weight Scanning: The weight scanner can weigh the items that are put into the trolley to ensure the tag corresponds to the correct item. It can also help with a security check: if a malicious user peels off the RFID tags before putting them into the trolley, the trolley can detect it as extra unaccounted weight is added.

- Billing generation on smart carts: When a product is placed in the trolley, the RFID reader reads the tag information and conveys the same to the microcontroller that will then communicate with the server through GSM/GPRS.

- Smart checkout point: The checkout point is installed with a point of sale for the buyer to make a purchase. After making the payment, a buyer has to go through a lane where an RFID reader can read all the items in the trolley and check with the server if all the items have been paid for. Any overpay or underpay will trigger an alert.

- Data transfer and sharing: To view the list of purchased products by the store administrator and client via the website.

- The expired product cost will not be added to the total bill.

- If any purchased product has to be removed from the trolley then the tag has to be swiped twice.

- As the customer puts the products, the cost will be added to the total. Once the customer has finished the entire shopping then he can press the finish button to end the process and hence the entire bill is displayed on the LCD and as well as it will be transferred to the master billing counter and hence this provides ease of shopping to the customer.

5. EXPECTED OUTPUT

The Trolley's database would get updated whenever a product is being dropped into the trolley. The trolley's database consists of the details of the name of the product, cost of the product, manufacturing and expiry dates of the products, and the total cost of the products that are being purchased. Whenever a product is being removed from the trolley, it is updated in the database as well as on the LCD automatically.

Fig: Product 1
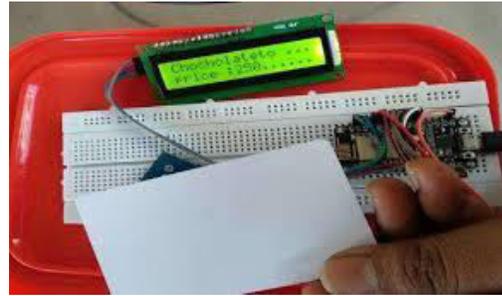
Fig: Product 2

6. ADVANTAGES

❖ It becomes easy for the store to do inventory management as all items can be automatically read and easily logged.
❖ Computational overhead at the smart cart side for higher efficiency.
❖ Time consumable.

7. RESULT

- The result of our project seems to be beneficial to all the people who decide on a budget for purchasing the products.

- Also, it will help to consume time and the increasing manpower will become less at the billing section.

- This system can be also implemented using LI-FI, NFC & other communication systems.

- In addition to the product details, nutrition facts of the eatables can be added.

- Automatic track detection & movement of the cart can be implemented by using various sensor technologies.

- The same system can be used in various places.

8. CONCLUSION

- The proposed model is easy to use, low-priced, does not require any special training.

- This model keeps an account and uses the existing developments and various types of radio frequency identification and detection technologies that are used for item recognition, billing, and inventory update.

- As the whole system is becoming smart, the requirement of manpower will decrease, thus benefiting the retailers.

- Theft in the mall will be controlled using this smart system, which further adds to the cost-efficiency.

- The time efficiency will increase phenomenally since this system will eliminate the waiting queues.

- More customers can be served at the same time thus benefiting the retailers and customers as well.

9. REFERENCE

- D.M. Dobkin, The rf in RFID: UHF RFID in practice. Newness,2012.
- Dr. Suryaprasad J, Praveen Kumar B O, Roopa D & Arjun A K " A Novel Low-Cost Intelligent Shopping Cart",2014 IEEE.
- Amine Karmouche, Yassine Salih-Alj, " Aisle-level Scanning for Pervasive RFID-based Shopping Applications", 2013 IEEE.
- Prasiddhi K. Khainar, et.al., " Innovative Shopping Cart for Smart cities" 2nd conference on Recent Trends in Electronics Information & Communication Technology, IEEE 2017.
- Swati zope, Prof, Marutilimkar, " RFID based Bill generation and payment through Mobile", International Journal of Computer Science and Network, Volume 1, Issue 3, June 2012.

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