

Integrated Smart Grocery Trolley System

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Abstract- The project entitled "IOT Based Intelligent Trolley for Shopping Malls" is based on developing a project to reduce the store's spending time and make everyday shopping items an experience instead of wasting time. Modern and cheap technology like mobile and minicomputers used by this cart to make it intelligent and save time. Instead of wasting their time standing in long queues at the checkout counter, it can help the consumers utilize the saved time in other fruitful activities. The Proposed system required an RFID tag reader, motion detector sensor, Liquid Crystal Display, pushbuttons, switches, and Zigbee. The microchip and an antenna will transmit a signal to a 'tag reader.' RFID tags have been used as a substitution for barcodes in a few areas, and we can use radio waves; RFID tags can be 'read' at ranging distances from some centimeters to over 100 meters. They have enabled all items to be given a unique identity number. Innovative idea of integrating Grocery Trolley Smart Billing System used in Supermarket by Arduino.

Keywords- RFID Reader, RFID Tags, Arduino UNO, LCD sensor.

I. INTRODUCTION

A blast of interest in RFID and supporting innovations due to their quickly growing use to follow items through the staple flexibly chain has been seen in the previous few years [1]. Because of its quick and viable reaction nowadays, RFID's are viral and assuming a critical part in many progressed ventures [3]. Utilizing radio waves, we use RFID, which is a tag for the unique ID of items. Many information like items name, costs, size, weight, and other data are held by this tag utilizing their distinguishing proof number. Market shopping is accomplished more proficiently by actualizing this RFID innovation for novel distinguishing proof of every item [10]. Such applications screen Store-Keeping Units (SKU) instead of individual item things since thing level tagging was not yet viable because of the moderately high RFID organization cost and supermarket items' shallow overall revenue [2]. Be that as it may, diminishing monetary and other specialized worries to a great degree, one can rapidly understand a circumstance where all things are tagged with an RFID mark in the supermarket [11]. RFID implanted utilized in shoppers faithfulness cards to recognize people. In urban areas, massive shopping centers,

buying, and shopping at super shops are regular [5]. The surge is additionally much more when there is a celebration of the restrictive offers and limits. Numerous things are bought by the client and put onto the streetcar [4]. Clients need to go to the charging counter for an installment when they bought the things. Utilizing a standardized identification peruser, the client will set up the bill at the charging counter, which is a tedious cycle and will make long lines at charging counters [6]. RFID tags are appended to all the items in the shop [7]. Its unique code will be distinguished, and the cost of those items will be put away in memory when a client places any items in the streetcar. The costs will naturally get put on the absolute tab when we put the items on the streetcar. The charging will be done in the streetcar itself [8]. The absolute bill data will be moved to PC by remote Transmitter and collector modules at the charging counter. When the client buys an item, she/he first outputs the RFID tag of the item utilizing the RFID peruser and afterward put it into the streetcar [9]. While buying the items, the client needs to examine the item's RFID tag; its cost is taken and put away in the framework's memory [10].

II. RELATED WORK

In the Literature audit, we will examine the various attributes of the task by referencing the current ventures that look like the working of the current undertaking.

Galande Jayshree et al. [1] build up a framework that can be utilized in shopping centers to unravel the test as referenced previously. The framework will be set in all the streetcars. It will comprise of an RFID peruser. All the items in the shopping center will be outfitted with RFID tags. When an individual places any items in the streetcar, its code will be distinguished, and those items' costs will be put away in memory. As we put the items, the costs will get put on the complete tab. Accordingly, the charging will be done in the streetcar itself.

Ashmeet Kaur et al. [3] Paying bills by remaining in a long line is a tiring variable when individuals need to buy products from stores. Even though individuals can immediately utilize electronic cash offices, they are compelled to hang tight in the line for a more drawn out time. The thought which is proposed utilizing RFID innovation will

conquer the issue, and it gives. The consolidated impacts of agreeable and adaptable usage, secure transmission of record data, and diminished debates offer the accompanying advantages for all. It will spare time, energy, and HR for Customers, Owners, and providers.

PROBLEM STATEMENT

Customer dissatisfaction because of the long waiting time for the checkout process. Involvement of a lot of human resources, which is expensive and manual billing. Use barcode for billing. Compassionate staff is needed for billing. Low product cost but overall expenses are much high and difficult to track the product. Getting product information is difficult & time-consuming. It does not disclose any automatic way of indicating to the shopper how the total bill is affected as objects are added or removed from the cart.

III. OUR SYSTEM MODEL

A) MODULES DESCRIPTION

1. Registration

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

Producer number	Product number	Product name	weight	Expiry date	HMAC
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2. RFID Tag Scanning

Radio-Frequency Identification tags are used to identify and locate items using radio signals. They consist of a microchip and an antenna, which transmit a signal to a 'reader.' RFID tags have been suggested as a substitution for Barcodes in some areas because they use radio waves, RFID tags can be 'read' out of the line of sight and at distances ranging from a few centimeters to over 100 meters. They also enable individual items to be given a unique identification number, rather than just a product code. In this Futuristic Billing Trolley System environment, each product will contain the passive Radio Frequency ID tag bearing a unique Electronic Product Code. This Electronic Product Code provides information about the product, i.e., its name and price. As soon as the buyer puts the Smart Trolley product, the Radio

Frequency ID reader scans the tag, thereby generating the Electronic Product Code number. The fetched data is passed to the microcontroller, where further processing takes place.

3. Billing Generation on Smart Carts

A smart shopping system should involve lightweight cryptographic methods due to limited computational power. Both symmetric and asymmetric encryption is combined to tackle this issue. When a commodity is placed in the cart, the RFID reader reads the tag information and conveys the same to the microcontroller that will communicate with the server through Arduino System.

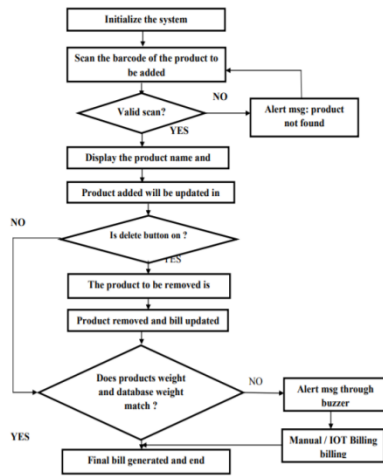
4. Smart Checkout Point

The checkout point is installed with a Point of Sale (POS) to make a purchase. After making the payment, a buyer must go through a lane where an RFID reader can read all the items in the cart and check with the server if all the items have been paid for. Any overpay or underpay will trigger an alert.

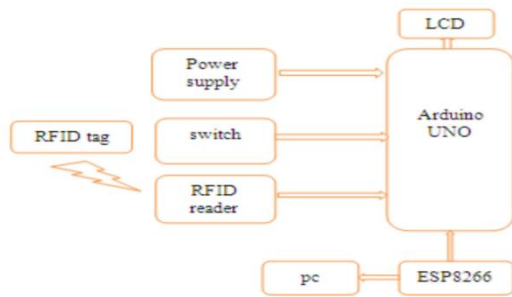
B) ALGORITHMS OF THE PROPOSED WORK

- Start the procedure.
- Initialize the system
- Scan a product in RFID tags.
- Check the RFID tags.
- If the tag is registered or scanned, the RFID reader can read the information from memory.
- Display the data and cost with the help of LCD.
- The item is added automatically, and the total cost will be calculated and displayed on LCD.
- If any item is removed, the total cost is deducted by the particular removed item, and again the process will be continuing.
- On pressing the send key, the total amount will reflect on the billing system.
- Bill will be generated, and a text message will be sent to the user.
- The process is ended.

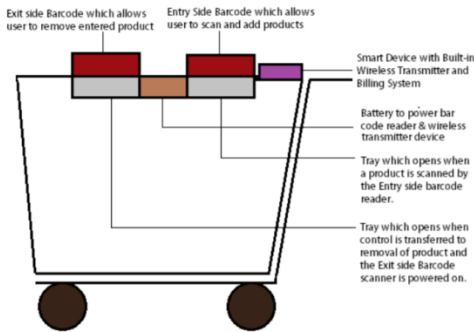
C) FLOWCHART



D) BLOCK DIAGRAM



E) TROLLEY DESIGN



VI. RESULT AND DISCUSSION WITH GRAPH

Unique RFID tags given in table II are used to indicate specific products being shopped. As the RFID card reader read the product, details were displayed on the display unit. The product details of the shopped items were temporarily stored in the local memory. Once the shopping "Complete" button was pressed, the memory contents were read, and billing was done. The same product information data was sent back to the server to update the inventory.

Table II. Sample Database of product details.

RFID TAG ID	PRODUCT NAME	PRICE
222801	SOAP	Rs.10
257082	RICE	Rs.20
168543	No name assigned	Used for confirmation

The following test case scenarios were used in the integrated system testing to prove the developed system's working.

- Shopping cart and server communication using the wireless ZigBee module.
- They are identifying items based on RFID tags and synchronizing with the central database.
- Automatic billing Display the product name & price. Complete listings of the products along with their price on the LCD. Update inventory in the central system upon each purchase of a product.
- Automatic billing update when the products are dropped in the cart or removed from the cart. Display of total bill on the master pc. All test cases were successfully tested. The system developed is user friendly, and no special training is required to use the cart.

V. CONCLUSION

The proposed project has finished, and the framework deals with the client's financial plan, and it adequately kills the long lines. This framework is robotized, and it is superior to the current Barcode framework. With new advancements quickly making varying social statuses savvy, shopping ought to be made more intelligent. The framework is fast and direct in the charging choice. Advances that catch data about collaborations between actual products are not yet adult enough for the customer market as they are generally excessive. It isn't easy to imagine a circumstance where broadly conveyed retail administrations can work without such principles. The savvy shopping streetcar task's controlled climate has been conceivable to address this issue on a remote premise.

Further, the truck can have an engine and sensors, because of which the truck won't require any actual power to move around. This element can be useful for more established grown-ups. The client tracks the subtleties of the bought things just as the current bill sum on their cell phone just as on the screen that is joined to the truck. Notwithstanding that, it incorporates taking care of the accompanying extraordinary cases, which guarantees that the framework is reasonable in all

regards. The framework recognizes all the cases referenced beneath. Endeavor to take products by keeping these into the truck without checking their standardized tags when the client filters a product yet neglects to keep it in the truck. Endeavor to filter one product yet place different products in the truck. Endeavor to remove one product of high cost by filtering the standardized identification of another product. Purchasers alter their perspectives; our usage considers eliminating any product previously positioned in the truck without assistance from anybody. The customer can likewise be helped by the route framework, implying that they can be guided through the supermarket, maintaining a strategic distance from time misfortunes while looking for products in obscure areas.

REFERENCES

- [1] International Journal of Emerging Technology and Advanced Engineering, RFID Based Automatic Billing Trolley, Galande Jayshree, Rutuja Gholap, Preeti Yadav.
- [2] ICICES2014 - S.A.Engineering College, Chennai, Tamil Nadu, India. Smart Shopping Cart with Automatic Billing System through RFID and ZigBee. Mr.P. Chandrasekar Ms.T. Sangeetha.
- [3] Ashmeet Kaur, Avni Garg, Abhishek Verma, Akshay Bansal, Arvinder Singh, Arduino Based Smart Cart, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 2 (12), 2013.
- [4] Thangakumar J, Sainath S, Surender K, Vikram Arvind V (2014) Automated Shopping Trolley for Super Market Billing System. International Conference on Communication, Computer, and Information Technology.
- [5] Suganya R, Swarnavalli N, Vismitha S, Rajathi GM (2016) Automated Smart Trolley with Smart Billing Using Arduino. International Journal for Research in Applied Science & Engineering Technology 4: 7-9.
- [6] Harpreet Singh Bedi , Nikhil Goyal, Sunil Kumar and AvinashGuptaSmart Trolley using Smart Phone and Arduino May 23, 2017
- [7] 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
- [8] Raju Kumar, K. Gopalakrishna, K. Ramesha on "Intelligent Shopping Cart" in International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 4, July 2013
- [9] Ankit Anil Agarwal, Saurabh Kumar Sultania, Gourav Jaiswal and Prateek Jain on "RFID Based Automatic Shopping Cart" in Control Theory and Informatics; ISSN 2224-5774 (print) ISSN 2225-0492 (online), Vol 1, No.1, 2011
- [10] Iswarya. C, Josuva. D, Vasanthakumar. R "Arduino Based Smart Billing System Using RFID", Int. Journal of Engineering Research and Application.
- [11] Tanushree, Siddharth Yadav, Saksham Aggarwal, Sagar, Mohit Yadav, Neeraj Gupta, Shruti Karkra. "Ingenious Shopping Cart: RFID Enabled for Automated Billing." IJCSMC, Vol. 5, Issue. 5, May 2016, pg.209 – 214.