Smart Billing Trolley for Shopping

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Abstract: **Purchasing and Shopping in huge shopping centers is turning into a day by day action in metropolitan urban communities. There will be a ton of flurry in these shopping centers during the special seasons and ends of the week. This group becomes tremendous when there are exceptional offers and discounts. Individuals purchase various things and put them into the cart. After completing the purchase, one needs to go to the billing area for payment where the staff member prepares bill by means of bar code reader which takes more time and the client needs to stand in lengthy queue for payments. To avoid this Radio Frequency Identification (RFID) is used. RFID innovation cannot just assist smooth running inventory and supply network; it also avoids crowd in shopping centers. Every shopping cart includes RFID tag, to discriminate its group. Every cart is structured with a product ID that includes a microcontroller, LCD, RFID scanner and Bluetooth which connects the android phone. The mobile app displays the product details and the cost of the product along with the total number of items and total price of purchased products. The payment can be done through UPI, card or cash. The fundamental objective of this work is to give programmed paying mode to avoid queue in shopping centers and grocery stores.**

Keywords: **LCD, RFID reader, RFID tags, Renesas microcontroller.**

1. Introduction

In the world of Internet of Things (IoT), associations among manual objects have become a reality. Regular things would now have the choice to be furnished with computing power and correspondence functionalities permitting objects of any place to be connected with one another. This has a new change in manufacturing, business and environmental systems and provoked major challenges in data handling, remote communications and real-time decision-making process. Similarly, different privacy and safety matter have risen and cryptographic mechanism are in more requirement to fit in IoT app. There have been a lot of IoT experimentation on several applications such as intelligent homes, e-hospital structures and electronic gadgets. This centers around an intelligent shopping framework reliant on Radio Frequency Identification (RFID) development. Everything available to be purchased are been done using a RFID label, so that can be tracked by gadget outfitted using a RFID scanner in the shop. This brings with central focuses on:

- Items added into a shopping cart can be scanned as a

default operation and the payment data is produced. Along with these customers don't need to hold up in large queues at exit.
- Smart carts that are equipped with RFID scanners can screen each and every product and send product update notices to the server. Right when product reach sold out, the server can notify administration department to repurchase.

The Smart Cart is attached with RFID for items recognition and a trustworthy Wi-Fi relationship of the store server. It includes a LCD screen that shows clients about item costs, cut offs, offers and the final bill amount. Right when the product is added to or removed from the trolley, RFID recognizes the item and modifies the bill. Precisely when the client finishes with purchasing he/she can basically press

the "End" button and the details are sent to the shop's payment server and client needs to pay total cost and quit. "Here purchasing will revise the way of shopping slowly as ATM"'s changed banking." Proposed cart are user friendly and there is no need for special training. The cart's inbuilt automated payment structure makes shopping is carried out in easy way and has a positive result of freeing staff from products scanning process, decreasing number of staffs and increasing efficiency. The utilization of ultra-high frequency (UHF) RFID mechanism is proposed in the purchasing framework, as UHF labels has drawn out range from 1 to 12 meters. Pervious analysis on the design of intelligent purchasing system fundamentally dependent on utilizing less/more frequency RFID, that have various stretch and allows customers to verify things with a RFID scanner.

In this framework, every cart is attached with and RFID scanner, a microcontroller, a LCD contact display, and the bluetooth module. The intelligent cart can subsequently read the products added to cart by means for the RFID scanner. A micro controller is included in cart for information processing and an LCD display is set up as UI. All together for the cart to interact with the mobile app bluetooth is used. Moreover, cart can be added with a weight scanner for measuring things. The weight scanner used as safety check process. For instance, if a malicious customer takes off one thing's RFID label and places in the cart an extra missing weight can be incorporated. When purchasing has been completed by a customer the billing can be

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made at the exit point with the help of payment data made for that cart. A RFID scanner is kept prior to the exit door in order to verify if every products in the cart have been paid or not. Safety and privacy problems related to intelligent purchasing process are considered. Remote communications are made in the server intelligent cart and on delicate products to avoid theft. If there is no correct security technique other customer can easily fool in the communication method. Security issues also exist i.e., the competitor of a store may get straightforward entry to the progression of items for business related technique and client preferences can be inferred by successfully collecting the products data in clients purchasing cart.

2. Literature Survey

In [1], the different things we buy in purchasing center with assistance of shopping cart. These thing getting is few hazardous methodologies. In client accommodation they need to pull the streetcar for each an ideal opportunity to get-together things and simultaneously. Resulting to buying, client need to manage the tab for buying. At that time, they need to hold up in a huge line to buy their things investigated utilizing RFID scanner using assistance of standardized conspicuous verification Scanner and get charged. To change that client needs to buy in quick manner in strip purchasing center. Each single thing needs to put a RFID standardized distinctive verification to channel the thing with RFID scanner. The cunning streetcar will include a RFID scanner, LCD show and ZigBee transmitter. Right when client if need to purchase anything is introduce in streetcar. It yields and reads the thing and shows the expense and the name of it on LCD. The all over expense of all bought things will be on the last tab, in last bill, bill will be spared with the Arduino will go about as a memory.

In [2], Despite of nearness of E-marketing individuals will in generally purchase more items in grocery stores and purchasing centers for their own fulfillment. Out of the challenges looked by the customer's trouble to finish line the charging methodology. Despite the fact that the aim is easily to buy a few items, standing back to charging products ruins time and furthermore awkward nowadays as individuals live in a bustling situation. As per our overview amount and time spent on each client is more particularly in stuffed markets. The retailers are prepared to invite any tool that automates the charging method to diminish labor and time expended for that process. The principle idea is to fulfill the customer and decrease the time utilized on the charging method to finish the charging procedure of the streetcar as opposed to sitting tight in a line in any event, for a couple of items. The clients need to include the items after a short output in streetcar and when done the settled sum will be shown in the streetcar. Client could either take care of their tab by their ATM cards or through pre-energized client card gave by the shop. We have guaranteed security for forestalling burglary and furthermore encouraged for clients who unwittingly drop their ventures into streetcar by advised them. Our definitive adage is to relieve the time utilization in buy by

disposing of line guaranteeing client's solace and contracting the monotony of standardized tag filtering and dispensing with pursuing of billers, along these lines achieving both client and businessperson requests.

In [3], Mall is the place people get their everyday items. There has been a rising enthusiasm for quicker and less complex portion of bills in malls. In the current circumstance, various models have been made including interfaces, figuring's and gear stages to help sharp shopping. In this paper, we propose a model named Smart Trolley using ZigBee to motorize the charging methodology in shopping. This system relies upon distinguishing proof of things, weight estimation and charging. This Smart Trolley fuses the RFID scanner, RFID tag, Load Cell, LCD, ZigBee, and Controller. Purchasing thing information will be scrutinized a RFID scanner on sharp trolley and it is appeared in LCD which is included to the Controller. The Load cell is to evaluate the greatness of the thing against the weight information enrolled in the processor memory. At the charging point, the hard and fast bill will be moved to standard structure by ZigBee module.

In [4], A shopping center is the spot wide assortment of thing things is open. This thing can be garments, refreshments, books or food any private thing. The basic goal of business sectors is to give transparency of the amazing number of things and extra the hour of the buyer however now and a short time later buyer gets melancholy while holding up in the line at money counter and every once in a while they get bewildered while modifying the complete cost of the broad number of things with the fiscal course of action in the wallet before charging. To avoid these issues, purchasing centers utilize this process as a methodology to broaden the measure of buyers. In huge urban systems, everyone can watch a tremendous impact at shopping centers on completions of the week and month. This winds up being generously more when there isn't really awful variety of offers and rebate. Before long a day's family purchase a combination of things and put them in the truck. After by and large getting one should push toward counter for covering tab. By utilizing scanner, the paymaster readies the bill which is a dull. These abatements long lines at the money counters. This strategy gives a course of action to build up a framework in strip malls to keep up a vital good way from the above issue. Right when buyer places anything in cart the corresponding subtleties will be seen typically, the item name and rate will be showed up on LCD Screen, as such expense gets added to the last bill. In the event that a buyer wishes to expel the things from the astute truck, buyer can empty the thing and the cost of that specific thing gets deducted from complete aggregate and a near data goes to the focal charging unit by strategies for GSM module.

In [5], Since the time of remote advancement, electronic exchange has made so much to give easy, convenient and viability in regular everyday existence. In this paper, we talk about a notable thought of RFID based purchasing bin in the domain of retail. Where whole purchasing practice is routinely harmed by huge bill counter lines. After a certain time, we end

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the issue by displacing the inescapable Universal Product Code (UPC) normalized tag from sharp names, called as radio repeat conspicuous confirmation (RFID) tag. The main method here is to give guidelines with typical purchasing the extent that decline in time went through, abstaining from the step by step trouble of finding the right thing and staying in long lines. The fundamental goal is to give an advancement arranged, diminished cost, effective, trouble free, monetarily organized structure for an improved shopping experience**.**

3. Problem Statement

Purchasing and Shopping at malls is ending up as an everyday action in metropolitan areas. There will be huge lines at malls on weekends. This gathering turns out to be more when there are more offers. People buy variety of things and adds to the cart. After the process of purchasing one of them need to go to the payment counter for paying. At payment counter the staff generates the bill with the barcode scanner which requires more time and results in lengthy queue at the counter.

A. Existing System

The customers need to put everything which they need to buy in the shopping basket. After complete purchase client need to go to the payment section to pay the bill as shown in figure 3.1. The paying method is very hectic and requires more human laborers for the that process, however holding up time is very long. The barcode identification scanners are utilized at the counters which requires additional time.

Limitations of existing system:
- Barcodes don't have perused/compose capacities.
- It requires optical view checking.
- It is work serious as it requires to be checked independently.
- It is less secure than RFID which can be effortlessly produced.
- Scratched or folded scanner tags may cause issues while checking.

B. Proposed System

The key target of the future structure is to provide a skill involved with, minimum price and effortlessly accessible and a system to help purchasing. The RFID power-driven electronic purchasing cart is designed to enhance fast purchasing understanding automated device for shop clients. Adding a product in the shopping cart, the clients can access of the product data.

A customer moves into a purchasing area then she/he carries a cart. Each single cart is included with a RFID scanner for easy process of purchasing. The Smart Cart is attached with RFID as shown in figure 3.2 for items recognition. It includes a LCD screen that shows clients about item costs, cut offs, offers and the final bill amount. Right when the product is added to or taken out from the cart, RFID tag recognizes the item and modifies the bill. Precisely when the client finishes with

purchasing he/she can basically press the "End" button and the details are sent to the shop's payment server and client needs to pay total cost. The same details are displayed on the mobile app for client verification. Mobile app is connected using Bluetooth connection. Customers will be provided with the options for paying bills such as UPI, cash or card. Customers can easily pay and exit avoiding big queues and the time spent. This makes the customers to easy shop and also increases the profit of the shop owner. It also reduces the manpower utilized in scanning every product at billing section.

Advantages of proposed system:
- RFID tag and scanner ought not be in LOS to make the framework work.
- Unlike standardized tags, labels can store more data. Additionally, it adheres to orders or directions of scanner.
- RFID innovation is adaptable in nature and henceforth littler and bigger RFID are accessible according to application.
- Tags can be scanned uniquely just as read/compose dissimilar to standardized tags.
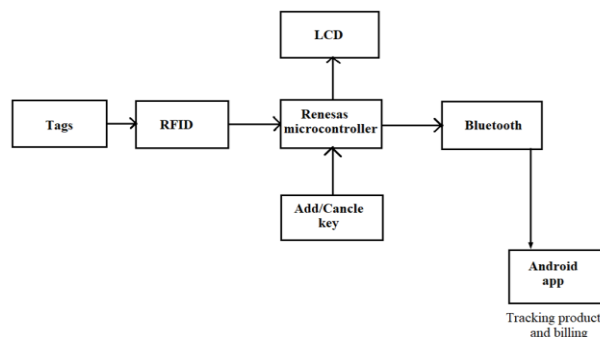
4. System Architecture

Fig. 1. System architecture

Here fig. 1, shows the architecture diagram of the proposed system where Renesas microcontroller is the heart of project, so which controls all the segments in the process appeared above in the figure. To implement this project, the system uses microcontroller, RFID, ALCD (16x2), RFID for wireless communication. Embedded device will be placed on the trolleys. All the items in the shopping center will be included with RFID labels. RFID reader reads the tag value of the item and displays amount, name of product, total number of items and the total cost and on LCD. If product is removed, the respective product amount is deleted from the product list. After the completion of the buying process the client needs to press the end button. The product details that are added to the cart are sent to the mobile app with the help of Bluetooth connection. The customer can pay bill through the mobile app and can also select the mode of payment such as UPI, card or cash. After the payment the user can easily exit without spending more time in payment process.

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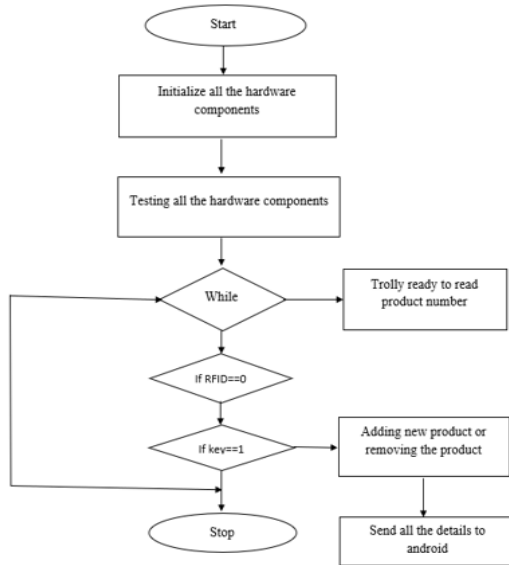
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5. Flowchart

Fig. 2. Flowchart diagram

The fig. 2, shows flow chart. The hardware is initialized and all the components are tested. While the trolley is read to read product number if the RFID is not compared with the RFID number of the corresponding product the product is added to the cart and the details of the product is displayed on the LCD and the next product can be added. Once the process is stopped it shows the total number of products and the product name along with the cost of the product on the LCD as well as the android app.

6. Methodology

- Initialize the system
- Scan the product using RFID labels.
- If the label is recognized or read, RFID scanner can scan the data from the memory.
- Display the product information and cost on the LCD.
- If any product is deducted, the complete expense is removed for the particular item.
- Again, the process continues.
- Once the process of purchasing ends the total number of products and final price in displayed on LCD.
- The client needs to press the end button after completing shopping.
- As the customer presses the end button the same product details and the total price is also shown on the mobile app/phone.
- The client can cross check the purchase list, if any of the product is missing user can buy at the same time.
- On clicking enter key the total sum will displayed on the server.
- Bill is generated.
- User can select any mode of payment such as card, UPI or cash.
- Pay the bill price.
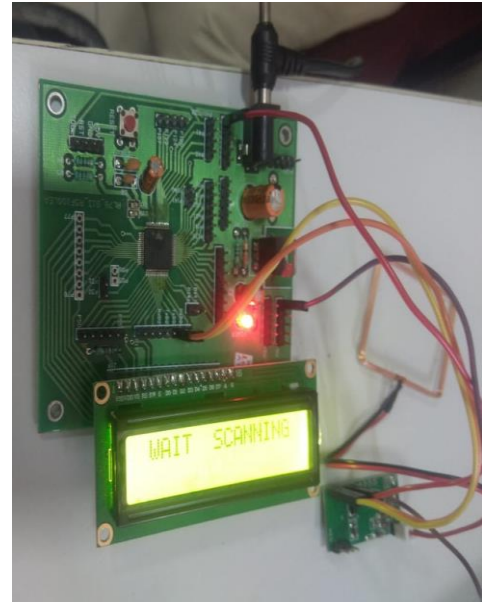- End of the procedure.

7. Results

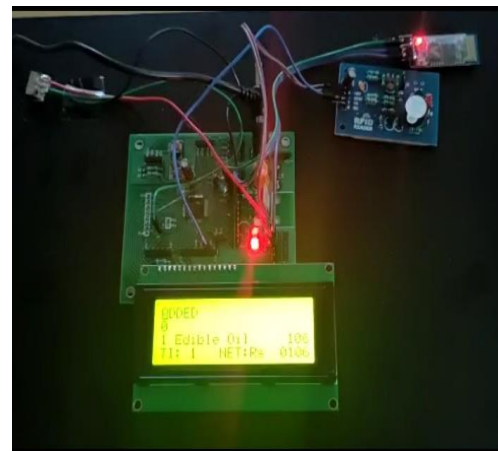Fig. 3. Shows the initialization of the trolley kit
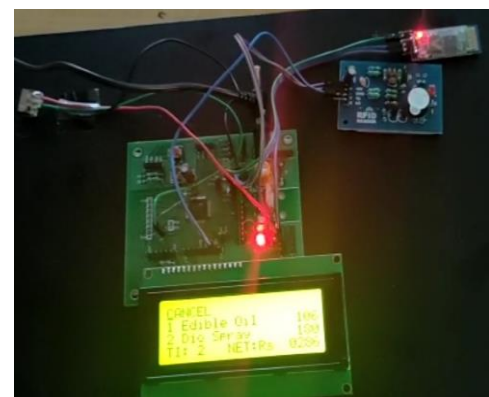

Fig. 4. Adding of items to trolley

Fig. 5. Canceling of item from the trolley

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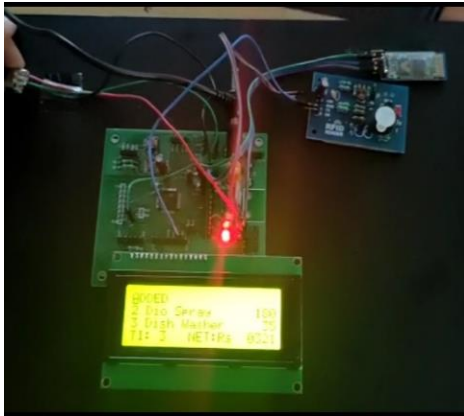**journals.resaim.com/ijresm | ISSN (Online): 2581-5792 | RESAIM Publishers**

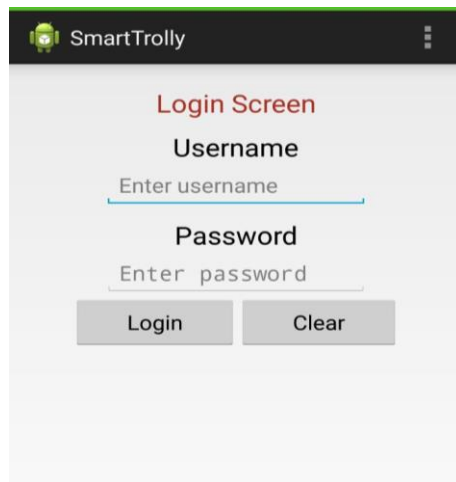Fig. 6. Final cost and total no. of items
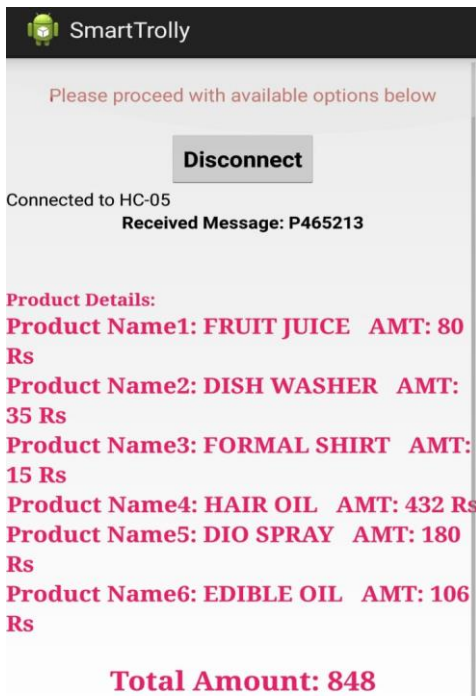

Fig. 7. Shows the login page of android

Fig. 8. Shows the product details and total cost to be paid
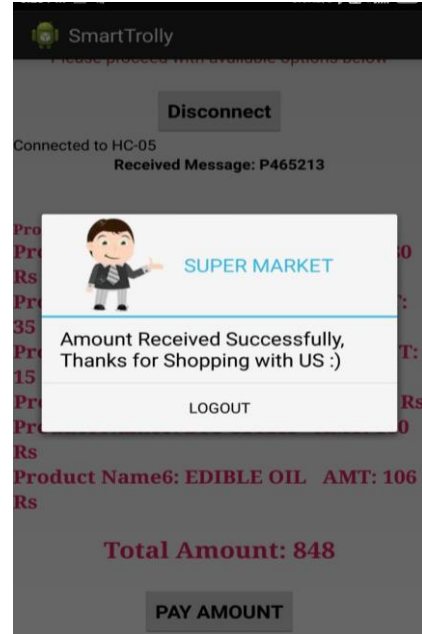

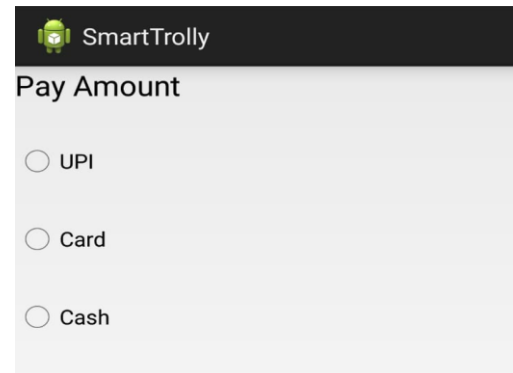Fig. 8. Shows the payment is successful

Fig. 9. Options of payment

8. Conclusion

The proposed model is easy and safe to operate and doesn't require any separate training. This method ensures safety, reliability, and the best value for customer's time. This model uses the current evolution and different kinds of radio frequency identification and recognition technique advances which are utilized for product acknowledgment and paying. After completion of buying the clients does not need to stand/ wait in queue for payment. The trolley will be having the details that are sent to the server directly customer need to selects their payment mode such as UPI/cash/card pay and exit. As the entire framework is turning out to be smart and demand of staff members will be decreased, profiting the retailer. The requirement of manpower for scanning the items at the billing counter is no more needed. Robbery will be controlled utilizing this intelligent framework. The time that is used to stand in the queue will be decreased. More clients can be served in a similar time which is advantage for the retailers as well as the clients.

References

[1] Machike K, Golait M, Rathod R, Petkar R, Goche P. (2017). A new technology of smart trolley using RFID and ZIGBEE. International Journal on Recent and Innovation Trends in Computing and Communication 5(2): 256-259.

[2] Thiyagarajan M, Aejaz M, Kumar M. (2017). RFID based advanced trolley for super market. Special Issue 8.

[3] Karpagam V, Balapriya S, Kalairubini G, Kalaivani A. (2017). Smart trolley with smart billing, International Journal of Computer Systems 4(3): 55-58.

[4] Gade A, Bhatt N, Thakare N. (2018). Survey on energy efficient cloud: A novel approach towards green computing. Helix 5(5): 3976-3979.

[5] Rupali Sawant, Kripa Krishnan, Shweta Bhokre, Priyanka Bhosale (2015). The RFID based smart shopping cart. International Journal of Engineering.