

Automated Smart Way Billing System in Shopping Malls using Arduino

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Abstract: Now-a-days, buying and searching at huge malls is turning into a daily activity in subway cities. We can see large rush at malls on holidays and weekends. The rush is even a lot of once there are special offers and discount. People purchase one needs to go to cashier for payments. The cashier prepares the bill victimization bar code reader that could be a time overwhelming method and leads to long queues at charge counters. This paper targeted to minimize the queue at a billing counter in a shopping complex. Smart trolley does the same by displaying the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter and leave with the commodities he/she has bought. The hardware is based on Arduino Uno, RFID Reader Module, RFID Card and Buzzer. It eliminates the traditional scanning of products at the counter and in turn speeds up the entire process of shopping also with this system the customer shall know the total amount to be paid and hence can accordingly plan his shopping only buying the essential commodities savings. Since the entire process of billing is automated it reduces the possibility of human error substantially. Also the system has a feature to delete the scanned products by customer to further optimize the shopping experience.

Keywords: Arduino, RFID reader module, RFID cards, buzzer, smart devices.

1. Introduction

Humans these days always go for the technology which is useful to them and have always invented a technology which will support their needs. Basically, humans want to decrease the tasks using the technology in faster and easier way in various fields available. A main thing where human spend maximum time is shopping. According to survey we can say human spend approximately 1 to 1.5 hours for shopping and most of the customers will always tend to walk out of a queue if it is long. As we know there are 2 types of shopping, i) Shopping in personal, ii) Online Shopping.

Here online shopping is the easiest way to shop as we don't have to be present physically in the shop or mall. Where shopping in personal, have to visit the mall or shop for shopping where customer have to wait in the queue for long time.

In modern world, all the supermarkets and malls have shopping trolley and baskets for customers to carry the

purchased products. When shopping is done customers have to proceed to checkout at the billing counter. Here this billing process is quite time consuming and have to employ more human resource at the billing section. So in this project, "Automated smart way billing system in shopping malls using Arduino" which will reduce the time of customers and will decrease the manpower at the billing section and increase efficiency. In the world where technology is important and the future of retail industry also lies in more automated devices.

A. Proposed System

Radio Frequency Identification (RFID) is changing into preferred technology as another to barcode systems. RFID systems gives automatic identification method, counting on storing remotely retrieving knowledge mistreatment RFID tags or transponders. An RFID tag is associate object that may be connected to or incorporated into a product, animal or person for the aim of identification mistreatment radio waves. Chip-based RFID tags contain silicon chips and antennae. In this paper, we developed a smart shopping cart system that allows customers to manage their shopping list while shopping and only pay the bill at the checkout counter. The cart has the power to calculate mechanically and show the

Entire costs of the entire product within it. This makes it simple for the client to understand what quantity he or she has got to play whereas searching and not at the checkout. This way the client will receive quicker service at the checkout. The advantage for the shop owners is that they would like fewer cashiers, which might end in an outsized cut in their prices.

B. Objective of Project

The objective of this project is to improve the speed of purchase by using RFID. This project is designed to use the RFID based security application in the shopping trolley. This project is used in shopping complex for purchase the products.

1. RFID (Radio frequency identification): The RFID card is used as security access for product. If the product is put in to the trolley means it will show the amount and also the total amount.

C. Problem Statement

The current system involves a large amount of manual handling on the part of customer. It helps in tracking and identification of trolleys, which is useful for the management of the shop but does nothing for the customer. It does not provide a feasible solution to reduce the time spent by the customer in the store, mainly while standing in line for billing and payment. This is because of a lack of alternative mode of payments and collisions issues as signals easily intercepted. The main drawback is the lack of satisfaction and ease of use on the part of the customer.

2. Literature Survey

1. *Published in 2019: "Automated Shopping and Billing System Using Radio-Frequency Identification"* This paper presents a comprehensive idea of an automated shopping and billing trolley system that utilizes Radio frequency identification with the billing side using mobile application. RFID technology offers the capacity to give numerous new administrations and comforts in the retail condition. It utilizes radio frequency to accomplish this. The RFID reader examines every one of the products when product is placed in the trolley. The data is shown on the display unit that is on the trolley for the customer to confirm the product purchased and simultaneously check the cost of every time.

2. *Published in 2018: "Electronic Shopping Trolley for Shopping Mall Using Android Application"* Today shopping has become daily activity in cities. People buy the product from shopping mall for their regular use. To get their products scanned using barcode scanner and to get it billed, the customers have to stay in long queues. To get relieve of this, a new electronic shopping trolley is proposed. In this paper they developed android application where the customer has to scan product barcode which they wish to purchase. The scanned product is automatically dropped into the shopping card of customer and then the customer can make payment online or at the billing counter.

3. *Published in 2018: "Smart Shopping Cart"* This system gives solution to reduce the shopping time at supermarkets. Every supermarket employs shopping trolley in order to aid customers to select the products which they intend to purchase. At billing counter customer may face many problems like waiting and don't know even they have sufficient money for the products they purchase? The billing process at the counter is a time consuming and also need more human resource in the billing section. To tackle this problem, they have proposed a solution in which a smart shopping cart is used to overcome these problems. It has barcode scanner and touchscreen display, which can be used to scan the products and display the product information, cost and total bill.

4. *Published in 2018: "Robust low-cost passive UHF RFID based smart shopping trolley"* Retailers are often interested in low cost mechanisms to maintain stocks as well as for tracing products across the supply chain in an efficient and effective manner. In addition, shoplifting is another concern faced because of the lack of effectiveness in product tracing technique

such as barcode used in retail super markets. In this study, they propose a low-cost, robust, passive UHF RFID based shopping trolley system which allows tracing and processing shopping data in real time.

5. *Published in 2017: "IoT Based Smart Shopping Mall"* In shopping mall or supermarket, they are using barcode technique for billing the products. It takes lot of time and customer has to wait till all products get scanned to generate the bill. To avoid this situation, we proposed IoT based smart shopping mall. It consists of RFID tag, LCD display, android application, Wi-Fi and cloud. All products present in the shopping mall will be tagged with RFID. Customer's required products will be put in the trolley, where its code will be detected using RFID and name of the product and cost will be displayed on the LCD. Data is pushed to the amazon cloud using Wi-Fi module ESP8266 and the data is sent to Android App of the Customers. Total billing is done by wireless modules. We are providing a searching option for the customers to know the availability and unavailability of products in the shopping mall.

3. Methodology

A. Block Diagram

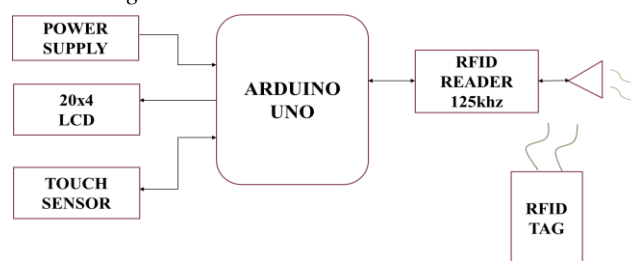


Fig. 1. Block diagram of automatic billing system

The automatic asking system can calculate the overall bill by reading the RFID tags connected to the merchandise place within the cart and can send total worth to the show.

RFID is that the special sort wireless card that has intrinsically the embedded chip beside loop antenna. The intrinsically embedded chip represents the twelve-digit card variety. This magnetic signal is transmitted by the loop antenna connected beside this circuit that is employed to browse the RFID card variety.

RFID reader is interfaced with the microcontroller. RFID reader works on Weygand protocol and transmits the wireless signal at a hundred twenty-five kHz. RFID reader has 2 information lines i.e. DATA0 and DATA1. Each the lines area unit active low and is connected at the external interrupt pins (INT0, INT1) of the microcontroller. Logic one is transmitted on DATA1 line and logic zero is transmitted on DATA0 line.

Interfaced RFID reader unceasingly transmits the magnetic attraction field across it. When the RFID tag/card comes at intervals this range; the RFID card gets supercharged up and provides their twenty-six-bit ID knowledge to the RFID reader.

Here every product has the individual RFID card that represents the merchandise name. Here the microcontroller is already programmed with card variety and interfaced with four switches.

When person puts any item within the tram its code is

detected and therefore the value of that item are hold on in memory. If user needs to delete any product from the tram, then he simply got to get rid of that product from the tram.

B. Design Description

While a user collects an item for consumption from the shopping mall and puts it into the tram, the code written within the frequency Identification antenna (RFID) tag strike to the merchandise is while not human intervention browse by the RFID reader put in within the tram.

The RFID code is then checkered with the catalog system for the equivalent product. Then the merchandise is further to the bill for the customer. With every dive of the merchandise into the tram the reader reads the RFID code from the merchandise to the bill for the customer. One time the RFID report the code, the liquid visual {display unit computer screen video display} permanent on the tram display the value and amount of each product.

The client has the choice of keeping back the merchandise and therefore the system would deduct the merchandise from the bill. After getting, the client will provide a final enter command to the asking system, the ultimate bill together with the value is written. The client will use his revolving credit to buy the merchandise by swiping it through the revolving credit reader put in inside the asking system.

- It is possible to rewrite the RFID tags.
- It doesn't need line of sight.

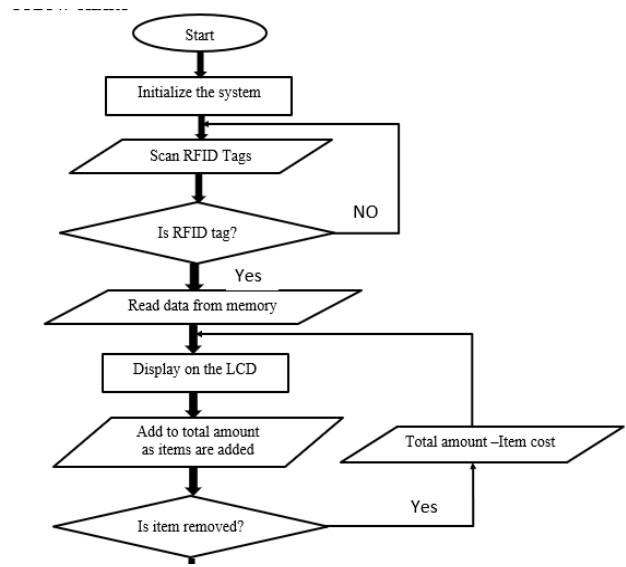


Fig. 3. Flowchart

6. Results

Smart shopping trolley is taken and entered into the mall, initially before adding the products the LCD display that Smart Shopping cart is ready Please Start Shopping as shown in fig. 4.

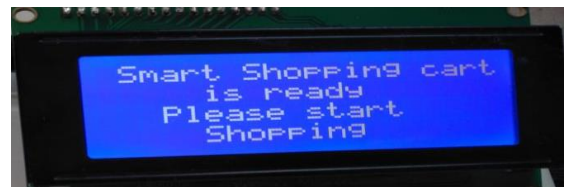


Fig. 4. Initially when the shopping is not yet started

Next it indicates to scan the items as shown in the fig. 5, so that we can scan the items using RFID reader which read the RFID cards attached to each items.



Fig. 5. Indication to scan the items

When we are adding the products after scanning RFID cards, the name of the item, price of the item and total cost will be displayed on the LCD as show in fig. 6.

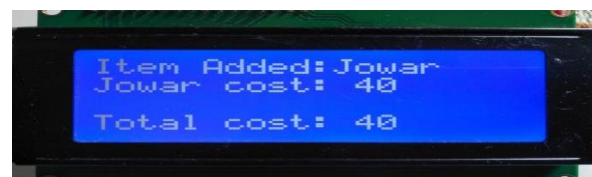


Fig. 6. When RFID tagged product is scanned and added

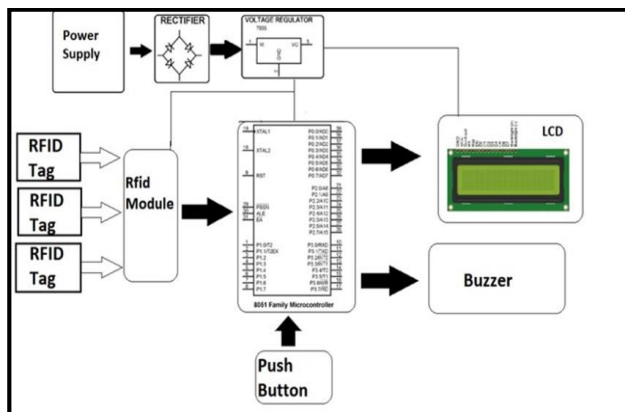


Fig. 2. Circuit diagram of automatic billing system

4. Implementation of Automated Smart Way Billing System in Shopping Malls

A. Flowchart

After the initializing the system reader will scan RFID tags. If RFID tag is found reader reads the tag and sends the information to microcontroller which then compares it with data stored in memory. If the tag matches with the data stored it will display data on the LCD. If items keep on adding it goes on adding to the total amount. If item from trolley is removed it deducts cost of that specific item from total amount is send to central billing unit.

5. Advantages of Proposed System/Approach

- It saves customer time.
- It also reduces the payoff given for workers.

When another RFID tagged product is scanned and added to the cart. Cost will be added automatically and displays the name of the item, cost of the item and total cost as shown in fig. 7.



Fig. 7. When another RFID tagged product is scanned



Fig. 8. When all items are added to the cart

When we add all the items to the cart the cost of each product gets added automatically and displays the total amount as shown in fig. 8.

If we want to remove any of the item in the cart then we should rescan the RFID tagged product which deducts the amount automatically as shown in fig. 9.



Fig. 9. Removal of undesired product

When we press the touch sensor the total amount will be displayed on the LCD and the cart is ready for next customer to

shop on pressing the reset button as shown in fig. 10.



Fig. 10. After pressing touch sensor total amount will be displayed on LCD

7. Conclusion

The work is done with the help of RFID technology, EM-18 reader, RFID tags and Arduino. Its aim is to reduce the time of billing for the customers and to ease the process of shopping so that the customers gets benefited. It can be implemented in shopping malls where there is a large crowd and huge rush into malls. In the world of Automation. This technology will replace the present barcode system which is present being followed. Hence this technology can help people to make their shopping easy and time saving too without any much human intervention. This also reduces manpower and shopping mall maintenance.

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