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# SHOPPING CART USING RFID

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**ABSTRACT:** Nowadays, buying and searching for products at shopping malls are turning into a daily activity in cities. We can see many numbers of people shopping at malls on holidays and weekends. The rush happens when there are special offers and discounts. People purchase completely various things and place them in trolley. After total purchase, one must visit the billing counter for billing and making payments. In the billing counter, the cashier prepares the bill victimization bar code reader that might be a time overwhelming method and leads to long queues at billing counters. This paper targeted to minimize the Queue at a billing counter in a shopping mall. The smart shopping cart 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 either in-app or in the billing counter and leave with the commodities he/she has bought. The hardware relies on Arduino Uno, RFID Reader Module, RFID Card, and Buzzer. It eliminates the normal scanning of products at the counter and in turn speeds up the entire process of shopping is easy and also with this system, the customer shall know the total amount to be paid. Hence the customer can plan his shopping only by buying the essential commodities according to his savings. Since the entire process of billing is based on RFID, so it reduces the possibility of human error substantially. The system also has a feature to delete the scanned products by customers to further optimize the shopping experience.

## I. INTRODUCTION

Project objective: In the present-day shopping system one of the difficulties is to follow queue through the billing process which is time consuming. Hence this project aims to reduce the average time spent by the customer at the shopping mall by implementing automatic billing system using RFID technology.

In shopping malls various technologies are used like Barcode system, Mobile technology (using Android App), etc. In these system customers have to wait in long queue for billing. Hence, we proposed the new idea using IOT (Internet of Things). In this system RFID (Radio Frequency Identification) Technology is used. Every item or product is attached with a RFID tag and this product is scanned using RFID reader which is attached with a trolley. Customer purchase different items and put them in the trolley. Price of that total items and also names will be displayed on LCD (Liquid Crystal Display) screen which is also attached with a trolley. If a customer wants to remove some items, they have to rescan the item which will delete it from the total bill. In this system, customer's time is reduced at the time of shopping in the malls.

Project outline: The main aim of the project is to satisfy the customer and to reduce the time spent on the billing process which is to complete the billing process in the trolley rather than waiting in a queue even for one or two products. The customers must add the products after a short scan in trolley and when the shopping is done the finalized amount will be displayed in the trolley. Customer could either pay their bill by their pre-recharged customer card provided by the shop. Finally, the whole information will be sent to central Pc of the shopping mall. This proposed system uses RFID technology. Every product is attached with Radio Frequency Identification (RFID) tag. For scanning this tag RFID reader is used which is attached to the cart. As a result, bill is generated in the cart itself and is displayed on the LCD which saves the time of the customer.

### Benefits of our Project: -

1. Due to the pandemic, consumers' awareness of safety and health have been stimulated. Consumers care more about their health and safety in public places, for example, in supermarket.

2. The smart shopping cart could provide safer shopping for customers. Take Supermini smart shopping cart as an example, there is an antibacterial handle on the cart, the antibacterial rate can up to 99.99%. This will greatly help prevent disease in the shopping process.

3. Besides, in the shopping process using a smart shopping cart, consumers don't have to contact or communicate with others could greatly ensure customers' safety and health.

#### **Drawback of our Project: -**

There is one distinct disadvantage of the smart shopping cart, children can't sit on the smart shopping cart. This may be bad news to consumers who take their little children to the supermarket So may be young mother will not choose the smart shopping cart for shopping.

## **II. RELATED WORK**

### **1. The automated shopping trolley for supermarket billing system.**

As per our knowledge only few papers were found in the literature for the automated shopping trolley for supermarket using RFID. The automated shopping trolley for supermarket billing system implemented by Sainath (2014), exploited barcode for billing of products, where customer scans the product using barcode technology. The bill will be forwarded to the central billing system where customer will pay them by showing unique id. The limitation of barcode scanning requires line of sight for scanning and it should be fixed within its boundary. Cash register lines optimization system using RFID technology by Budic (2014), developed a system for shopping using RFID.

### **2. IOT based intelligent trolley for shopping mall.**

RFID technology for billing during purchase in shopping malls and IOT is used for bill management by means of ESP module. The payment details will be sent to the server by which central billing unit will deal with customer's payment. The ESP module will be working as a short distance Wi-Fi chip for wireless communication. But there is a drawback which includes constraints such as distance and interference. Server will be busy if customers are high and internet connectivity should be stable for finishing the process.

Smart shopping trolley using RFID by Komal Ambekar (2015), implemented smart way of shopping trolley with RFID and ZigBee by which bill is generated by scan of products in the reader and bill transmitted to central billing Department by which bill can be paid at the counter which is a major difficulty for the Customer.

### **3. Shopping and automatic billing using RFID technology.**

An automatic billing with server end. This scans products by radio frequency identification and then the bill is generated at the server end which is then communicated to the customer. This requires server maintenance and internet connectivity both for the customer and shopkeeper. Smart shopping cart with automatic billing and Bluetooth proposed by Prateek Aryan (2014), is a process where Billing is done in a trolley and transferred to the android mobile of the user via Bluetooth. Every customer can't be expected to have a smart phone and Bluetooth can have connectivity issues and range is less.

### **4. Smart Shopping System with Inventory Control**

These days, when a client needs to purchase an item, the client needs to put the item in the shopping basket, and afterward place it in the RFID truck peruser to peruse the RFID labels appended to every item. The pertinent insights regarding the item will be shown in the portable application, before the client associated with the shopping basket. Clients can without much of a stretch speak with the interface and utilize the different assets of the proposed framework. By utilizing the proposed administration, clients can choose the best items that place the item in the

shopping basket, and the expense will be remembered for the aggregate sum. After the buy is finished, the bill will be concluded by the client and itemized data will be shipped off the focal worker.

### III. PROPOSED METHODOLOGY

RFID technology is changing into preferred technology instead of barcode system. RFID is a system with automatic identification method. In this paper we have developed a shopping cart system which use this RFID technology in this system we have a shopping trolley which is integrated with a RFID reader module and products are tagged with RFID tags. Each shopping trolley is attached with a QR code and when a customer enters the supermarket, he/she scan the QR code and logs in to the assigned trolley and start shopping. When the customer drops an item into the trolley the item is automatically read by the RFID reader and add it to the shopping cart. When the customer is finished shopping bill is generated in the shopping cart and bill amount is directly deducted from the shopping wallet provided to the user, so there is no need of staff for billing.

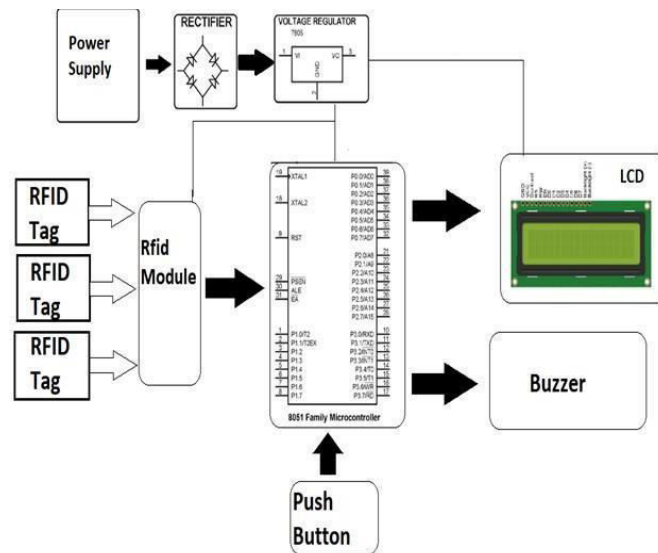


Fig.no.1: - Block Diagram

1. **RFID:** -Radio-Frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader.
2. **8051 Microcontroller:** -The Intel MCS-51 (commonly termed 8051, typically pronounced eight-oh-five-one) is a single chip microcontroller (MCU) series developed by Intel in 1980 for use in embedded systems. The architect of the Intel MCS-51 instruction set was John H. Wharton. Intel's original versions were popular in the 1980s and early 1990s, and enhanced binary compatible derivatives remain popular today.
3. **RFID Reader:** - A radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes. RFID is a technology similar in theory to bar codes. However, the RFID tag does not have to be scanned directly, nor does it require line-of-sight to a reader.
4. **LCD:** - A liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays

are super-thin technology display screens that are generally used in laptop computer screens, TVs, cell phones, and portable video games. LCD's technologies allow displays to be much thinner when compared to a cathode ray tube (CRT) technology.

#### IV. RESULTS

1. All the products in the mall will be tagged with RFID cards. When a person adds an item to the trolley, the card will be scanned by the RFID reader. 2. Reader sends this code to Arduino Uno which further reads the product's code and sends it to the cloud, where the product database is available. Then a smart shopping cart application fetches the data and displays it on mobile. The item details like name, price & total bill of things inserted in the cart are displayed on the mobile app. 3. As we add the items, the costs will get added to the total. Thus, the billing is done. Simultaneously all details are displayed on the mobile app. 4. And additionally, if we would like to get rid of some inserted item, then that product can be removed by pressing the push button and scanning it again from the trolley. The cost of the removed product will be deducted from the total amount which will be displayed on the mobile app. 5. Every trolley will have a separate Identification number. The smart shopping cart would be able to automatically read the products that have been put into the cart by scanning RFID. A buzzer is used for giving intimation when a product is added or removed.



Fig.no.02: Billing System



Fig.no.03: Swipe the product



Fig.no.04: Swipe the product



Fig.no.05: Items added in cart

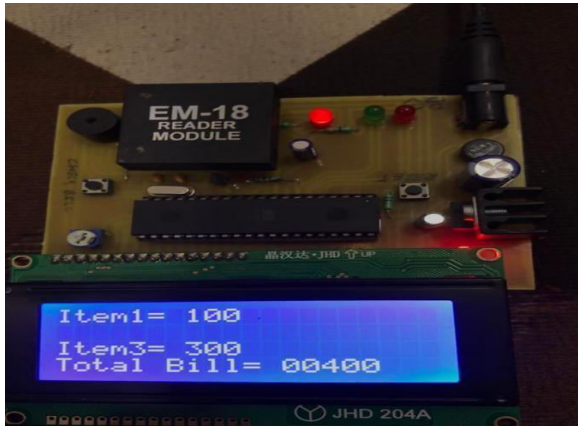


Fig.no.06: - Bill Generated

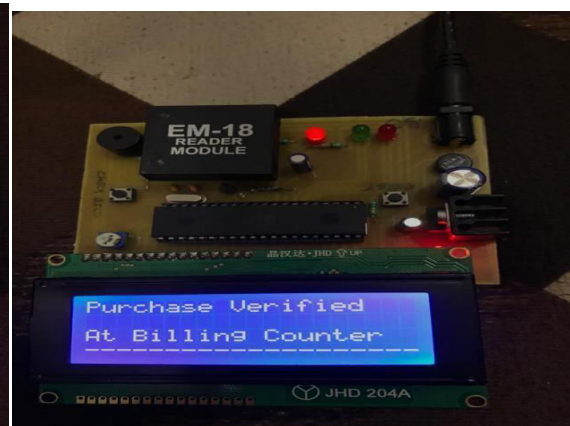


Fig.no.07: - Verified at Billing Counter

## V. CONCLUSION AND FUTURE WORK

The Work done with the help of RFID technology, EM-18 reader and Arduino. Its aim is to reduce the time of billing in long queues so that the customers get benefited and the same time inventory management becomes so easy. It can be implemented in shopping malls where there is a large crowd and huge rush into malls. In the world of Automation, this automatic billing system plays a major role in the upliftment of technology. This technology will replace the present barcode system which is present being followed. Hence this technology can help people to make their lives easy and time saving too.

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