



# A Review paper on Smart Trolley System for Automated Billing using RFID and IoT

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**Abstract:** In metro cities we can see a huge rush at shopping malls on holidays and weekends. This becomes even more when there are huge offers and discounts. Nowadays people purchase a variety of items and put them in the trolley. After total purchasing one should approach the counter for billing purposes. By using a barcode reader the cashier prepares the bill which is a time consuming process. This results in long queues at the billing counters. This project presents an idea to develop a system in shopping malls to overcome the above problem. To achieve this all products in the mall should be equipped with RFID tags and all trolleys should be equipped with a RFID reader and LCD screen. When one puts any product in the trolley its code will be detected automatically, the item name and cost will be displayed on the LCD, thereby the cost gets added to the total bill. If we wish to remove the product from the trolley, you can take away the product and the amount of that specific product gets deducted from the total amount and the same information can be passed to the central billing unit via WIFI module. Hence the billing can be done in the trolley itself thereby saving a lot of time to the customers.

**Keywords:** RFID, Arduino Uno, IoT, LED Display, Smart Trolley

## 1. INTRODUCTION:

Humans have always developed technology to support their needs and requirements. The basic need of alteration in technology, irrespective of the domain has been to simplify tasks and make everyday chores accessible and faster. As the growth of modernization a tremendous growth of people going to big super and hypermarkets for shopping and various purposes is seen. Shopping at big malls has become a daily activity nowadays in cities. We can see huge rush during festive seasons in hyper and super markets. People purchase diverse products and rush to billing counters that causes problem of big queue at the

end. The motive of the system of the system is to make a system that can solve the entire problem faced in malls by people. In the today's world, all super and hypermarkets should engage shopping baskets and shopping trolleys in order to aid purchasers to select and store the products which they have in mind to purchase. The process of billing consumes a lot of time and has created the need for shops to hire many labour resources in the billing section, and yet the waiting time remains considerably much for the customers. In the paper, we seemed it was convenient to propose the "RFID enabled automatic billing system" which targets to reduce, and possibly eliminate the total waiting time of purchasers, reduce the total manpower and raw material requirement and expenses for markets and hike the efficiency of the overall system. The whole arrangement of the components along with the RFID tag will be implanted in the trolley and all the items in the mall will have RFID tags. When people will pick up any product and place it in the trolley its code will be discovered and its price will be saved in memory, all the bill will be shown on the LCD screen. Therefore this system will reduce the overall time of shopping and make our shopping quite easy and simple.

## 2. LITERATURE SURVEY

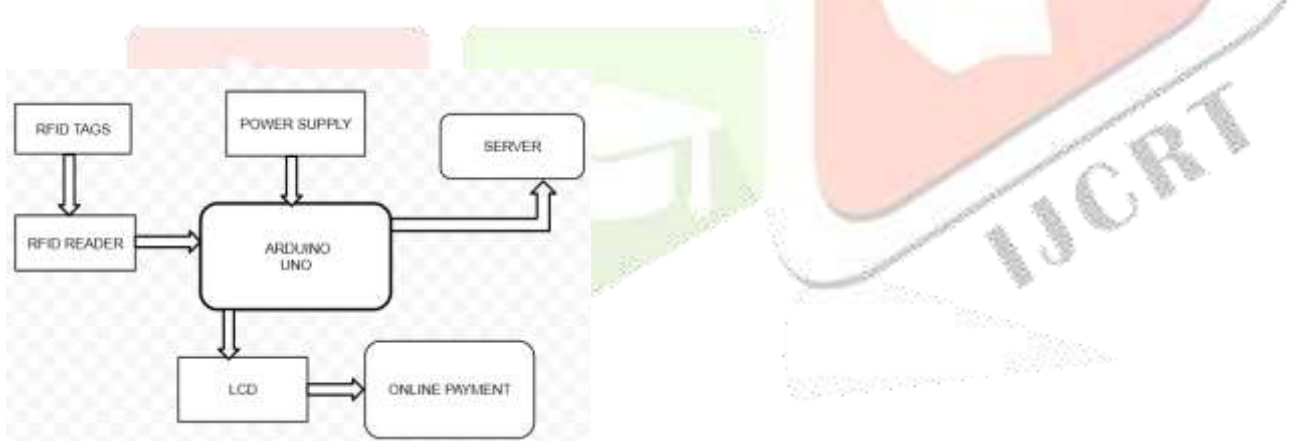
- 1). In the "IoT applications on Secure Smart Shopping System" the author Ruinian Li, Tianyi Song, Nicholas Capurso, Jiguo Yu, Jason Couture, and Xiuzhen Cheng implement the idea using UHF RFID reader so every smart cart is equipped with UHF reader. This system consists of microcontroller, LCD, weight sensor, and zigbee technology. This system is implemented for the security and privacy issues for make the system practical. The final result, final billing can be done in the trolley. So the users don't have to wait in a queue for long time [1].
- 2). In the "The Development of Smart Shopping Cart with the Customer-Oriented Service" the author Hsin-Han Chiang, Wan-Ting You, Shu-Hsuan Lin, and Wei-Chih Shih implement a smart shopping card that can be detected automatically the item is added into the shopping trolley. From the searching of SSC the navigation the purchasing in the mall is efficiently supplied [2].
- 3). In the "Smart Trolley in Mega Mall" the author Awati.J.S, S.B.Awati, They Developed microcontroller based design for users who wait in a queue so avoid the crowd at the billing counter and headache like pulling a trolley. They used LCD display, Max 232, Barcode scanner; RF module, RF transmitter & RF receiver, & Object counter [3].

## 3. PROPOSED IDEA

The main objective involved in this plan is to implement a smart shopping cart with the help of RFID technology for improvising purchasing . The plan is to employ the RFID related surveillance implementation practice in the purchasing cart. In this plan RFID card is used as a protection entry for acquiring commodities in the Shopping malls. If the commodity has been placed in the shopping cart the price of the product appears and accordingly the total amount will be shown and if we wish to remove the product from the trolley, you can take away the product and the amount of that specific product gets deducted from total amount .In this , the technology used is for obtaining the products thereby which boost security performance and speed while purchasing in shopping complexes.

The technological objective for our presented problem in shopping complexes is the practice of RFID technology for the instinctive recognition of commodities in the interior of the purchasing cart thereby annihilating shoppers intervening in the task of commodity purchase and for payment. The principle point of proposed framework is to give an innovation which is minimal effort oriented , effectively adaptable, and efficiently feasible for helping shopping in individual. With the help of this a lot of time will be saved at the billing counters .

## 4. GENERAL FLOWCHART



Block Diagram of Smart Trolley

## 5. HARDWARE COMPONENTS

- Arduino Uno
- RFID
- LCD
- MODULE
- ADAPTER
- BATTERY 11V
- ESP
- IR Sensor

### ARDUINO UNO:

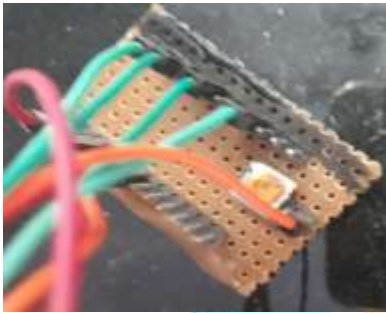
Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button.

**RFID:**

Radio-frequency identification (RFID) uses [electromagnetic fields](#) to automatically identify and track tags attached to objects. An RFID tag 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. This number can be used to inventory goods. There are two types. *Passive tags* are powered by energy from the RFID reader's interrogating [radio waves](#). *Active tags* are powered by a battery and thus can be read at a greater range from the RFID reader; up to hundreds of meters.

**MODULE:**

Module is a electronic device as we can see in the figure that is it not having any specific function or work of its own is made to function according to our device that we are using , now in our case we see that we have used module as the storage of power on one side and ground on the other side.

**6. WORKING**

We are using a 3.7\*3.7 voltage lipo battery( that gives a total output of 11v) due to its small,compact, little size and high capacity of work, with the aid of capacitor we filter voltage and we make it to 5 voltage that is optimal for our system to work.

The 5v power is then passed on to the arduino board and it divides voltages to different system according to its need .It supplies 3 volt to RFID and 3.3 to AS117 that is used to connect to WIFI , with the help of this we can easily connect our basket with an android app made for arduino. .

In this app with the help of hotspot we will connect our basket with an application which helps us to monitor the billing of our products easily.

RFID helps the recognition of the materials being purchased from the shopping mall.It is a wireless transmission of communication method that uses of electromagnetic or electrostatic couple in the radio frequency portion of the electromagnetic spectrum for unique identification of an object, animal ,item or any person .Understanding the function and working of RFID in a lay man language we say that a receiver and transmitter end is there the catches the signal from the receiver end and pushes it to transmitter from that it is attached to led buzzer or any other object to get output so that it is comprehensible .It reads all those objects in which there are RFID tags so that IOT can catch its frequency . In our project we are using RC522 which is compact, small ,easy and user friendly to use.

Previously used 125khz EM-18 RFID which was hard to control and had problem of bugging In our project we are using 13.56mh RFID that is easy to control compact in shape size and has no problem of bugging .It produces a 13 bit data that is easily manageable we are using AS117 to connect shopping bill to a online application from there we will be able to get a bill of all the items that we have purchased and bought .Finally we have a LCD that is of size 20\*4 which is compact and enough for our system . what ever we are purchasing along with its amount will be displayed on the LCD screen ,after all the shopping is done overall price of the product will also be displayed on the screen of the LCD.There is one major change in system that is previously video cameras were mounted on the trolley or the basket made system bulky and bigger but in our system we are using RFID tags with RFID that made overall system look compact and quiet simple.



**Fig: Design and Hardware Implementation of the Smart Mirror.**

## 7. RESULT:

This smart trolley envisions simplifying the billing process by helping customers in creating a shopping session which lasts until the customer commands it to be cleared. This session maintains the data of each product in the basket by using RFID tags to make the entry. It also helps in keeping the shopping experience in budget by displaying the total cost to the customer. By the emerging trend of online shopping, which reduces the hassle while shopping at stores, introduction of smart carts and smart baskets not only help the stores to eliminate the surge but also help to reduce the usage of paper, unnecessarily wasted in printing copies of bill, and the number of employees making it more economical and environment friendly. Thus the use of RFID based smart trolleys is of great interest and benefit to the society. The ESP attached to the system makes it far more compatible by giving the whole information of the shopping available on the android cell phones.

## ADVANTAGES:

- Reduces manpower required in the billing section.
- This can reduce the expenses incurred by the management.
- Users can be aware of the total bill amount during the time of purchase.
- Reduces time spent at bil
- Customers can get throughout information at time of shopping

## 8. CONCLUSION

Taking into account the changing trend in retail shopping, we come to a conclusion that the Intelligent Smart Trolley System for Automated Billing using RFID and IoT is most certainly a definite necessity for the Retail marketing industry to step up their portfolios , cope up with the advancement in technology and save time and manpower. Also, it would make the shopping experience for the customers a lot easier and time saving.

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