

# Novel Approach Smart Cart System in Super Market

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**ABSTRACT:** At present in Super Market we are using barcode scanners to scan each and every item at the billing section by the market attendant, this process is time consuming and engages the customer to stick to the billing section for long time. This by default increases the long queues and makes people wait. To reduce this we use on-spot billing which uses RFID and GSM technology to send bill to the Android application installed by the customer. This approach reduces the long queues and in-turn the efficiency is increased and shopping becomes more easy.

**KEYWORDS:** Smart trolley, Renesas RL78 microcontroller, RFID (Tag, Reader), LCD(20\*4), GSM, Android Application, Base station.

## I. INTRODUCTION

The modern technology has increased the standard of living for the humans. So, this has resulted in large crowds at shopping malls which have led to long lines at the billing counter because the cashier has to scan every product item and then enter it into the billing record. This problem has made people to turn towards online shopping. To attract customers back, the retailers or supermarket needs to find solution for this hectic long queues. So, we thought of finding a remedial electronic product to catch-up with this problem. We call it "Smart Trolley with Instant Billing to Ease Queues at Shopping Malls". This is based on Renesas microcontroller fitted with a LCD, RFID scanner and GSM. The main objective of proposed system is to provide a technology oriented, low-cost, easily scalable RFID system for shopping. The objective of this project is to improve the speed of purchase by using RFID. The brief description of its operation is, when you pick a product and drop it into the trolley, the product's price will be added and it gets displayed on the LCD screen. So after customer has finished with the shopping he/she has to click the finish button, the choice for the mode of transaction will be displayed on the mobile screen, after the amount is transferred receipt will be received in the mobile itself. This will save the time that was earlier being consumed to scan each item and speed up the process.

## II. BACKGROUND

The existing system consists of barcode scanners to scan the products purchased. By using this barcode technology there is an approach proposed where the customer should manually scan the items using barcode scanners while putting it into the trolley and the image of the item is clicked by the camera fixed near the barcode scanners. The barcode and the cart id, which is associated with the customer when he picks it up will be sent to the base station through single zigbee packet. The details consist of product name, weight, cost and quantity. There exists an additional attendant flag field which is sent only during cases of discrepancy i.e. when the weight of the product in the cart and weight of that product from the database is different then the flag is sent to base station then the market attendant has to manually change the details and send the bill details to the base station.[1]

In other approaches proposed which consist of RFID, microcontroller, LCD and a technique to connect cart to the server in general. RFID is used to collect information of each item. LCD screen is used to display the details of the item

that is read by the RFID. Microcontroller is interfaced with RFID, LCD and other components used.[4].There are many techniques that are implemented to connect cart to the server.here are the few technologies that are used .

LIFI is a technology that is used for communication between cart and the main server.it uses visible light for communication.The cart details will be sent to the base station or the main computer through LIFI technology after the shopping is completed.The bill is produced at the main station and customer has to visit the base station to complete the payment.LIFI technology works on visible light range which cant penetrate walls and is limited by physical barriers.The other sources of light will interfere with the signals [2].

Zigbee technology can also be used for the communication between the cart and the supermarket's server.Zigbee is a wireless communication system . Zigbee is typically used in low data rate applications that require long battery life and secure networking. In this model they used two modules of zigbee , one is connected in base station and other near the cart. After the shopping is completed, the costumer's shopping details is sent to the base station from the cart's zigbee modules to the base station's zigbee module. Later trhe costumer goes near the base station to pay the bill. The range of zigbee communication is limited [3]

The main drawback of all this systems proposed is,even after using all these technologies the customers should go to the billing counter and wait in the long queue to complete the payment process. It also requires human intervention.

### **III. NOVEL APPROACH**

The novel system illustrates to reduce waiting time of customer in shopping mall ans any kind of human invention.This system consists of Renesas RL78 microcontroller, RFID reader and tag, GSM, LCD display, android application.RFID is interfaced with microcontroller. Each and every product containing RFID tag have unique ID number to identify the product/.The RFID reader get the information about the product from the tag, when the customer put the product into the trolley,the details about the products, programmed in microcontroller which is in the cart is compared with a product details in the data base to give the details to the LCD.At that time customer can be able to see the product details such as name, price after product in the LCD, when the customer want to return the product from the trolley, the customer simply can use the navigation keys and press cancel button and takes off the product from the trolley .So that the quantity and cost of the product will be reduced from the total amount. Also product details from microcontroller can be sent to the customer's pre installed android application through GSM. The android application displays the bill details and the modes of transactions.The customer can choose one of the modes available and make the payment .

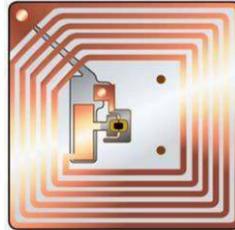
### **IV. COMPONENTS USED**

#### **A. RFID TAG:**

A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified. Two-way radio transmitter-receivers called *interrogators* or *readers* send a signal to the tag and read its response. RFID is used for distant reading of codes. There are 2 kinds of RFid tags- RFID tags that contain their own power source are known as *active* tags. Those without a power source are known as *passive* tags. A passive tag is briefly activated by the radio frequency scan of the reader. The electrical current is small -- generally just enough for transmission of an ID number. Active tags have more memory and can be read at greater ranges. A passive tag is cheaper and smaller because it has no battery. (Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user.).

Organized by

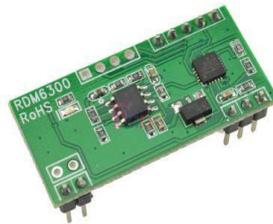
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*RFID tag*

## B. RFID Reader

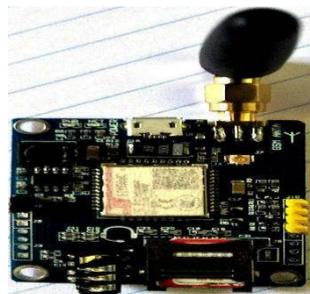
A radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID readers or receivers are composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via radio frequency (RF) communication.



*RFID reader*

## C. GSM(Globe systems for mobile):

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. It is used to connect the user device to the supermarket server. It has 4 pins- supply of 5V, ground, receiver and transmitter. It has the ability to transmit information in the form of voice (call), text (Short Message Service) and data (GPRS – General Packet Radio Service). Purpose of GSM is for sending the bill details to the customer and initiate the payment. Once the payment is done, the customer can check out.



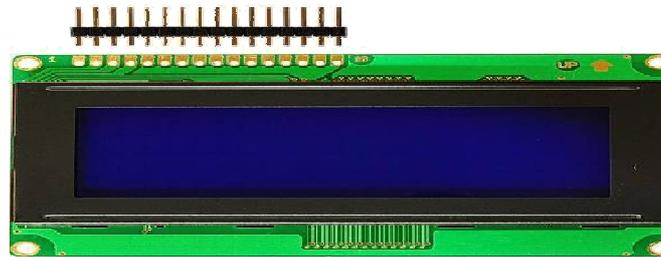
*GSM*

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#### D. LCD (Liquid Cristal Display)

LCD has the ability to display numbers and characters. Here we use 20 columns and 4 rows. Display the product name, price, expire date and total amount. Up/down switches are interfaced with the microcontroller which can be used to view all the purchase.



LCD

#### E. Renesas Microcontroller (RL78)

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.

Features of Renesas:

- 16-bit
- 4kb RAM
- 64kb ROM
- 64 pin IC
- 8 timers and 12 interrupts
- Input vol 12V
- Operating vol 5V
- Uses UART protocol for comm.



RL78 Microcontroller

## V. CONCLUSION

The proposed model is easy to use and does not require special training to use this model. RFID technology is used which is better than barcode system presently used. The requirement of manpower will decrease. The time efficiency will increase phenomenally as more customers can be served at same time. Theft in the supermarket can be controlled as RFID technology is used. This model reduces the human intervention. The details of the products purchased by the customers will be stored and the discounts, when available, on the product's will be sent to the customer this generates Big Data.

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