

# A New Technique for Smart Shopping Cart

Jonathan Edward Smith <sup>1</sup>, Ravi <sup>2</sup>, Srinivas <sup>3</sup>, Sutharshan <sup>4</sup>, SomaSundaram <sup>5</sup>

U.G. Student, Dept of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India<sup>1,2,3,4</sup>

Assistant Professor, Dept of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India<sup>5</sup>

**ABSTRACT:** Shopping malls allows the customers to shop variety of products under one roof. Since it does not need the customers to go to various shops to buy different products, and also saves the shopping time. Because of this, many people have started shopping in malls making them more and more crowded. So besides this big advantage, there is a major disadvantage of long billing queues taking much longer to bill the purchased products. Therefore it becomes pointless to go to shopping malls in order to save time. So if there were a system to generate the bill of shopped products automatically or simultaneously then it could save the billing time thereby revoking any need to stand in long queues. There are various techniques such as barcode scanner, camera, RFID tags and QR codes to generate the shopping bills on trolley itself. This system presents a new technique that uses MIFARE and card reader to make the shopping trolleys smarter.

**KEYWORDS:** MiFare, Camera, Shopping Malls, RFID Tags, QR scanner.

## I. INTRODUCTION

Nowadays, human lifestyle has changed. Day to day life of a normal human being has become a lot more hectic. Time has become money. So, people actually do not have much time to spend for shopping which is an inevitable thing. That is why people prefer shopping in the malls so that they can get all the products at the same place. This saves them from going into different shops to buy only a limited type of products. Though shopping in malls gives the advantage of saving time to people, they have only weekends to visit shopping malls. This creates a problem at the cash counter because of increasing number of customers. The customers have to stand in the billing queues for a lot more time than actual shopping time sometimes. Considering the general Indian population and way of thinking, the objective of the project is to design a smart trolley which will assist the customers in shopping by automating the billing process on the trolley itself which can easily be used by common people. The system should also keep a check upon total number of purchased and billed items in order to avoid wrong billing. The use of Mifare card reader and Mifare tags for the automation of billing process is the basic idea.

## II. LITERATURE SURVEY

The solution to the problem has been given by smart trolleys using different techniques till date. The methods used camera, RFID tags or barcodes to facilitate billing on the trolley itself [1]. The method using camera can be implemented using digital image processing to extract the barcode and read it. The system that uses barcode needs the customer himself to scan the barcode of the product using barcode scanner fitted on the trolley [2]. Another system used camera along with the barcode to keep a check on every customers shopping [3]. The method using RFID tags provides near perfect solution scanning the tags within the mechanical limits of the trolley [4],[5],[6],[7]. Another system used QR codes to automate the billing. One more method used a smart card along with RFID tags to facilitate the payment[8]. In this method the customer needs to scan the QR code printed on the products through a mobile application [9], [10], [11], [12]. The first method using camera involves a lot of image processing and becomes difficult to implement. The last method using the barcode depends upon the customer himself to scan the product which is practically not feasible [2], [3]. Though the method using

RFID seems to be a near perfect solution the tags being non-rewritable limits the level of performance [4],[5],[6],[7],[8]. The system involving QR code scanning needs unique QR codes for each and every type of products and a mobile application at the customer end which is too much dependency on the customer [9], [10], [11], [12]. The proposed system involves Mifare card reader and tags. Though the system seems to be like the RFID system, the tags provided here are rewritable. So the mall management can decide the data to be written on the cards which will then be scanned by the card reader fitted on the trolley by the user in order to bill the product. A sound notification will help the user be sure that the product has been scanned and billed successfully. This will ensure that the billing is correct. A constant display of the billed items will help the customer have an idea about the total amount. Till the time customer reaches the billing counter, bill will be ready and it will just be a matter of printing the invoice, paying the bill and removing the attached tags.

### III. PROPOSED WORK

The proposed system will basically involves in self-billing upon the trolley itself in order to save the time and also to skip queues standing for a long time. The products will be identified uniquely with the MIFARE tags attached to them. The products will be put into the trolley after scanning which will simultaneously generate the bill and the bill is displayed by using LCD. So the customers need not to wait for the bill nearby the billing section.

### IV. BLOCK DIAGRAM

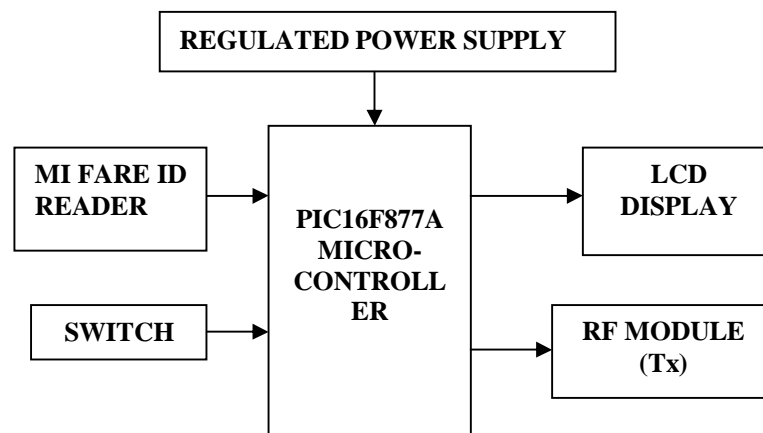


Figure 1: Transmitter

#### A. TROLLEY UNIT

In this unit the PIC microcontroller is attached to a MIFARE reader and RF Module. As the user puts the items in the trolley, the reader on the trolley reads the tag and sends a signal to the controller. The controller then stores it in the memory and compares it with the lookup table. If it matches then it shows the name of item on LCD and also the total amount of items purchased.

### **B. PIC MICROCONTROLLER**

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

### **C. MIFARE**

MIFARE tags also have the advantage of being read from quite a distance, unlike bar codes, which needs to be shown to the reader. Multiple MIFARE tags can also be read simultaneously thus allowing parallel processing. These characteristics can be used to prevent theft or shoplifting using an alarm that goes off once a specific RFID embedded product moves out of range.

### **D. POWER SUPPLY**

The AC supply is applied to 12V step down transformer. The transformer output is the 12V AC which is rectified using a diode bridge. The output of Diode Bridge of 12V DC is filtered by capacitors.

### **E. LCD DISPLAY**

LCD has the ability to display numbers, characters and graphics. The display is interfaced to I/O port of microcontroller (P0.0-P0.7). The display is in multiplexed mode i.e. only one display remains on at a time. Within 1/10th of a second the next display switches on. In this way sequentially on and off display will result in continuous display of count due to persistence of Vision.

### **F. RF MODULE**

RF module consists of RF transmitter and RF receiver. It is a small electronic circuit used to transmit and receive radio signal. It selects one out of a number of carrier frequencies. Types of RF module are:

- 1) Transmitter module
- 2) Receiver module
- 3) Transceiver module

In this project we have used Tran receiver type RF module. It is a small PCB sub assembly and is capable of transmitting and modulating a radio wave that carries data. Transmitter modules are implemented alongside a micro controller which will provide data that can be transmitted to the module.

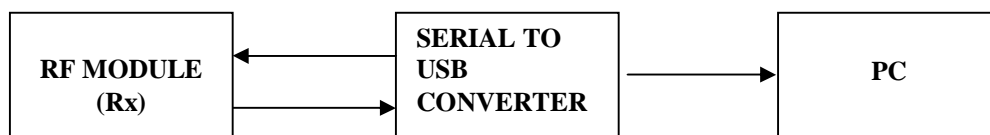


Figure 2: Receiver

### **G. SERVER UNIT**

As soon as the shopping is over the user comes near the billing section .The total bill will display on the billing computer.

## **V. EXPERIMENTAL RESULTS**

Each shopping cart is designed or implemented with a Product Identification Device (PID) that contains microcontroller, LCD and MIFARE reader. Purchasing product information will be read through a

MIFARE reader on shopping cart and it is displayed in LCD which is interfaced to the controller. At the billing counter, the total bill will be transferred to PC by RF module. When a customer purchase a product, he/she first scans the MIFARE tag of each product to the MIFARE reader and then places it into the trolley. After scanning the tag, the price and name of the product is displayed in LCD. As the products are added continuously, the cost is also generated accordingly. When key is pressed the total number of items and its cost is displayed in the LCD. The complete shopping information is send to the server PC with the help of a RF module. Finally the bill is generated at the counter.



**FIGURE 3: HARDWARE ON TROLLEY SIDE**



**Figure 4: Hardware On Server Side**

## VI. CONCLUSION

The proposed system is easy to use, economical, and does not require any special training. This system simplifies the billing process, makes it simple and it also increases the security using MIFARE technique. Hence the proposed system will take the overall shopping experience to different level.

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**Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India.**

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