# "RFID Based Automatic Shopping Cart Billing System Using AVR"

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## ABSTRACT

*The modern technology has increased the standard of living for the humans. This resulted in large crowds at shopping malls. To handle the large crowd, wemustreduce the process of the billing time. This is done using smart shopping system based on RFID.Items that are put in a smart shopping cart are read one by one and the bill is generated and displayed. After the final bill is generated the customer pays the bill by using their Pre charged cards provided by the shopping mall. The aim is to reduce the time consumption needed for the billing system.*

*KEYWORDS:Shopping Trolley, Super Market, RFID ATMEGA32*

## 1.  INTRODUCTION

In recent times, the RFID technology has been developing rapidly and we're seeing its applications in a variety of industries, from employee ID cards being scanned in the office to the issuing of books in libraries. RFID stands for Radio-Frequency Identification, where information is digitally encoded into tags which can be used to uniquely identify a product. The RFID tags are generally captured using radio waves and the captured data is stored into a database.

The RFID tags are somewhat similar to the traditional barcodes in their purpose and functionality, as they are used for data processing. However, thereare a few key differences between the two. Barcode usually requires a barcode reader to visually register the code in order to obtain information, while in the case of RFID, the use of radio waves as a means of recording data means that no line of sight is required. RFID has automatic tracking enabled and allows new information to be updated from time to time while the barcode scanning requires one to manually track the data and have no provision for updating records. RFID overcomes the drawbacks posed by barcode system which also include durability issues.

The system allows a customer to scan the items and the trolley automatically updates the total cost and bills the customer. It also has the provision of setting a budget, which when exceeded, sounds an alarm, as well as the removal of products and their cost from the total bill if a person deems it unnecessary. The system is built such that billing information is sent to a central server in real-time using the ESP8266 wifi module which tracks all the shopping trolleys and allows the client to log into the integrated app to track purchase and make payments digitally on the spot.

## 2.  LITERATURE SURVEY

The automated shopping trolley for super market billing system implemented by Sainath (2014):Exploited barcode for billing of products, where customer scan the product using barcode technology.

In 2009, the University of Arkansas Information Technology Research Institute Complete a study to determine the business value of RFID item-level tagging for day to day operations at a major luxury retailer. The result demonstrate that inventory accuracy more than 27 percent, under stock decreased by 21 percent, and overstock decreased by 6 percent.

ISSN:2278 – 1323 International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 2, Issue 12, December 2013, 3084 www.ijarcet.org Public awareness of RFID was heightened in recent years when the U.S. Department of Defense and retail giant Wal-Mart required their suppliers to use RFID technology.

Bill Macbeth in April 2013 said:To survive in 2013 and beyond, retailers need to make it easy for consumers to buy anywhere, receive anywhere, and return anywhere. This requires having a very accurate, real-time, item-level picture of inventory at all these sources. RFID has proven to improve perpetual inventory accuracy in stores dramatically, by 20%-30%. JC Penney improved perpetual inventory accuracy from 75% to 99% in categories using RFID.

Ankit Anil Agarwal, Saurabh Kumar Sultania, GouravJaiswal, Prateek Jain (2011):

In their paper RFID Based Automatic Shopping Cart described the implementation of a system to allow the consumer a new way of shopping. When arriving at the supermarket, the consumer heads towards a shopping cart that has a technological system on its handle-bar which consists of a touch-screen monitor, a client card automatic reader, a positioning transmitter and a product reader. Nevertheless, all these technologies become transparent to the consumer because only monitor interaction will occur.

## 3. PROJECT WORKING
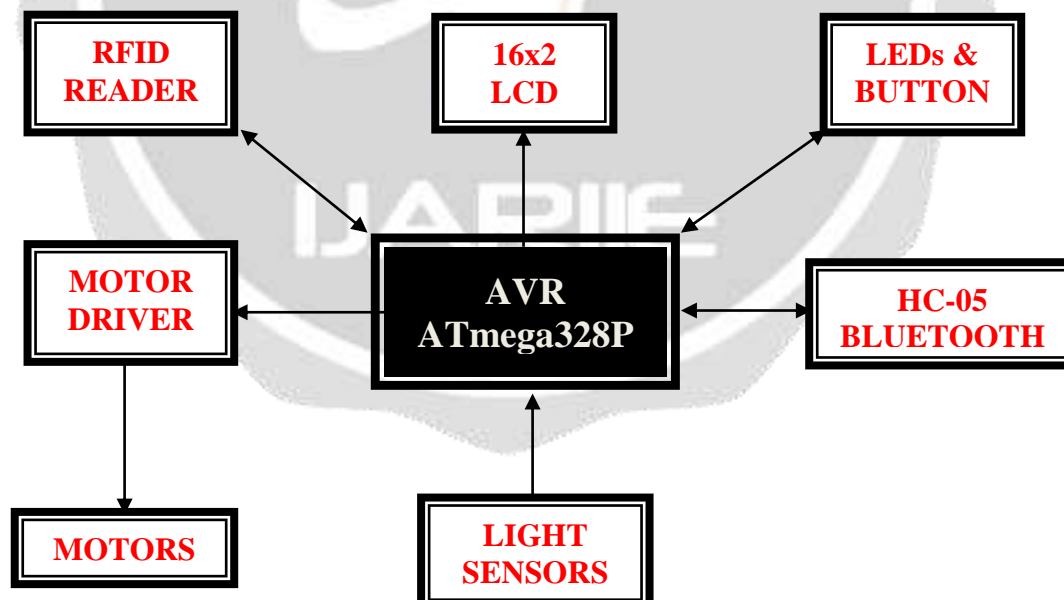


BLOCK DIAGRAM

1.  Trolley Cart Design: The methodology that we propose is based on the idea of creating an automatic billing system while shopping made possible using RFID assisted by other IOT based technologies. All the products in the shopping malls or supermarkets are provided a unique RFID tag instead of a barcode. Each shopping trolley has its own setup which contains an RFID reader, a server motor along with a door, ESP module, a push button to make payments or cancel orders, and an LCD screen to display all information related to the item.

2. Micro-controller: ATMEGA328P chip that delivers high performance at a low cost. Based on AVR-RISC core for microprocessors, it combines its readwhile-write ability with a flash memory that clocks in at 32KB, giving users complete control over the versatile applications of the chip in multiple areas. The RISC architecture ensures a quick execution of programs and the ability of the chip to be used in extreme temperatures makes it one of the most popular controllers. It can be easily operated at 1-1.5 Volts.

3. Reader: RFID each trolley is reinforced with an RFID reader, and the type of reader that is used is RFIDRC522. It is a low-cost RFID reader which can also write data into the tags if required and can be directly loaded into the reader module for modulation and demodulation of signals. It operates at 13.6 MHz frequency and can operate wirelessly and handsfree in any environment making it a suitable choice as anRFID reader for a supermarket trolley. It also supports encryption techniques and algorithms and error detection in modules for a reliable experience.
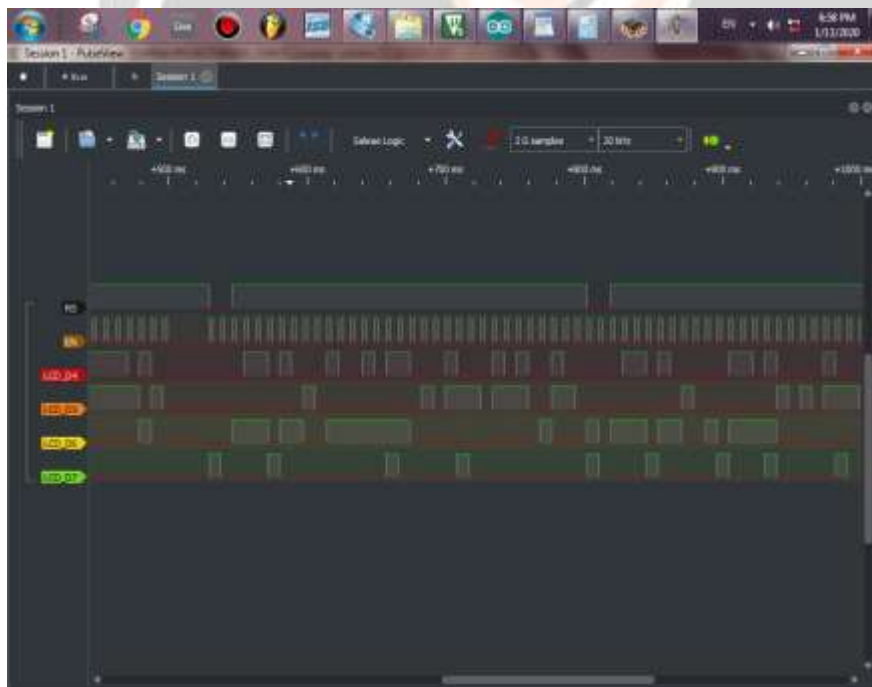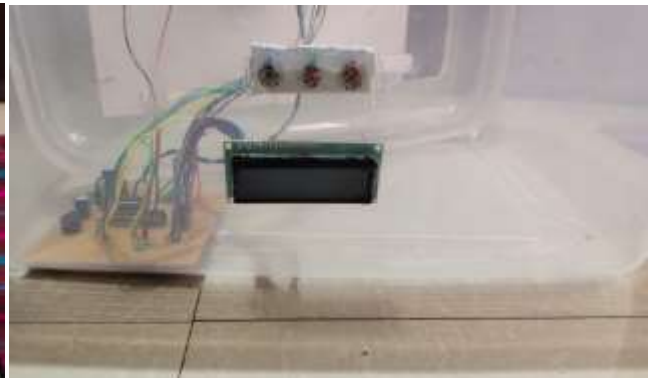

FIG. RFID READER

4. LCD Display: A 16X2 LCD touch-enabled LCD screen is used for displaying the information. The LCD screen can display a multitude of alphanumeric characters and graphics on its screen. It is connected to the I/O port of ATMEGA328P chip and can display information in real time.

5. HC05 Bluetooth: HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC.

6. Servo Motor: The servo motor here functions as a part of a mechanism to secure the products once a purchase is made, to prevent the case of thefts and enable a security feature. It is a simple device used to precisely control the angular rotation, acceleration, velocity, or linear position. The sensors are used to measure the rotation at every point and control its motion.

7. Push Button: It functions as a simple switch that performs a function like payment and cancellation when it is pressed upon. It sends high voltage electrical signals on feedback generated from the user to set a task in motion.The Payment button is used to display the total cost of all the items in the trolley that were scanned using either the screen or the app. The Cancel button resets the total value to default.

## 4. RESULT

The proposal finally resulted in an effective outcome where RFID technology replaced barcode due to its drawback where barcode requires the line of sight and should be placed in its exact boundary while scanning, but RFID's only constraint to be considered is its distance coverage. RFID tags are more durable than the barcode which damages due to temperature, water, physical tear etc. This ensures the process of scanning easy and precise. Then the password authentication process aids in avoiding the illegal usage of smart cards and also prevents data sniffing. The door in the trolley doesn't open until a product is scanned which doesn't allow to place a product inside a trolley that is not scanned. The tracking of count of products using IR sensor placed

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## 5. CONCLUSION

The proposed model is easy to used, low priced and does not require any special training. As the whole system is becoming. Smart, the requirement of manpower will decrease, thus benefiting the retailers. Theft in the mall will be controlled using the smart system, which further adds to the cost efficiency. The time efficiency will increase phenomenally since this system will eliminate the waiting queues. More customer can be served in same time thus benefiting the retailers and customer as well.

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