

# Automatically Adopted Smart Trolley Using RFID

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**Abstract-** People need to buy many products only in supermarkets and malls for their own satisfaction instead of E-commerce. Customers feel sometimes uncomfortable; one among them is to follow the queue through the billing process. Though the customers' intention is to buy one or two products, it consumes more time to wait in the queue to bill the products and it would also causes fatigue. According survey has been carried out, the cost and average time spent on each customer is high especially in over-congested supermarkets. So the supermarkets and malls need a smart machine that automates the billing process and reduce the manual work for that process. The main aim is to fulfill the need of customer and also minimize 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 have to add the products into the trolley and after the scanning the final amount is displayed in the trolley. Customer could pay their bill by their ATM cards or through pre-recharged customer card provided by the shop or through cash. The main goal of this work is to diminish the time consumption in purchase by getting rid of queue ensuring customer's comfort and decreasing the tiresomeness of barcode scanning and also eliminating waging of billers, thereby accomplishing both customer and shopkeeper demands.

**Index Terms-**RFID, super market, trolley,

## 1. INTRODUCTION

Bluetooth controlled trolley is restricted by using android mobile phones, instead of any other method like automatic buttons, gesture etc. Here only need to touch button in android phone to control the trolley in forward, backward, left and right directions. So here android phone is used as transmitting device and Bluetooth.

Due to its fast and effective response, the RFID's are widespread and takes main role in many projects. Generally RFID's are tags that are used for unique identification of goods by using radio waves. These RFID's are more advantageous over predictable Barcodes as they have a major drawback which is Line of sight technology. These barcode tags have constraints in its robustness whereas the RFID's tags are more durable and able to read/write data which could even be encrypted. These tags hold data like products name, price, size, weight and other information using their identification number.

The proposed Shopping trolley framework plans to help shopping in-individual and minimizes the time spent in shopping. Persistent change is required in the customary time spent at the counters to enhance the nature of shopping background to the clients. To beat these issues expressed above and to enhance the current framework, this work is composed of a Shopping trolley. This is done by connecting RFID labels to the items and reader is placed in cart. This framework will save time of clients.

Shopping is done more easily by implementing this RFID technology for unique representation of each product in a market. This could be done by installing an RFID reader on Shopping trolley to scan each

product and load it which is controlled by a micro controller.

## 2. PROBLEM STAEMENT

Nowadays markets are utilized by a considerable amount of individuals in order for securing most of items. Item purchasing department faces many problems that involves time spent in passageways, item area and checkout lines. Costumers usually face some difficulty during purchasing. These problems are worrying about the insufficient money which they have brought for purchasing items and also wasting a lot of time at the billing counter. In order to overcome this problem, this project gives an idea to develop an automated trolley. To achieve this all products in the mall should be equipped with RFID tags and all trolleys should be installed with a RFID reader.

## 3. EXISTING APPROACHES

The automated shopping trolley for supermarket billing system was presented by Sainath[1] (2014), and author has 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 distinctive id. The limitation of barcode scanning requires line of sight for scanning and it should be fixed within its boundary.

Budic[2] (2014), has implemented Cash register lines optimization system using RFID technology for shopping in large market shops. The RFID is used for scanning products and the information is stored in the database which could be paid online or in a central bill. It also uses web application to maintain entire

shopping details. It requires maintenance of web application server. No necessary steps have been taken for the products that are accidentally dropped into the trolley by the customer.

IoT based intelligent trolley for shopping mall by Dhavale Shraddha[3] (2016), applied 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.

#### 4. METHODOLOGY

The brief working of this system is shown in Figure 1. This proposed system works as begin with customer first they takes a trolley as he/she gets into the mall. Every cart is installed with a RFID reader, a microcontroller and a LCD screen. When the customer starts dropping products into the trolley, the reader reads the tags and sends the information to the microcontroller. Block diagram of automated smart trolley is shown in Figure 1 is automatically adopted one. The microcontroller compares the information with the data already stored in it. The cost of that product will be displayed on the LCD screen for user, if the data matches. If the user wants to remove any product from the cart then they can take away that product from trolley and cost of that particular product will be deducted from the total amount without any delay.

##### 4.1. RFID tags:

These tags comprise of a microchip for storage of its unique number and a coil which acts as an antenna for radiating its stored data. RFID tags are used to uniquely identify products.

##### 4.2. RFID reader:

The frequency at which it works in 125kHz. It continuously emits RF signals throughout its range and whenever an RFID tag is inside its distance coverage it retrieves the information stored in the tag. Purpose of RFID reader is to retrieve the product information from their RFID tags.

##### 4.3 Infra-Red sensor:

It is an object detection sensor. Purpose of IR sensor is to count the objects entering the trolley for preventing misplacement or theft.

##### 4.4 Power Adapter:

The power adaptor is used for dc supply to the setup. It acts a rectifier where it takes input of about 240volts AC and 30 amps and gives output of 12volts DC and 1 amp which will be suitable to our setup. Purpose of power adapter is to provide a steady DC supply from an AC power source.

##### 4.4 Bluetooth module:

Purpose of this is for sending alert for unauthorized usage and invoice in the form of text as an SMS to corresponding user.

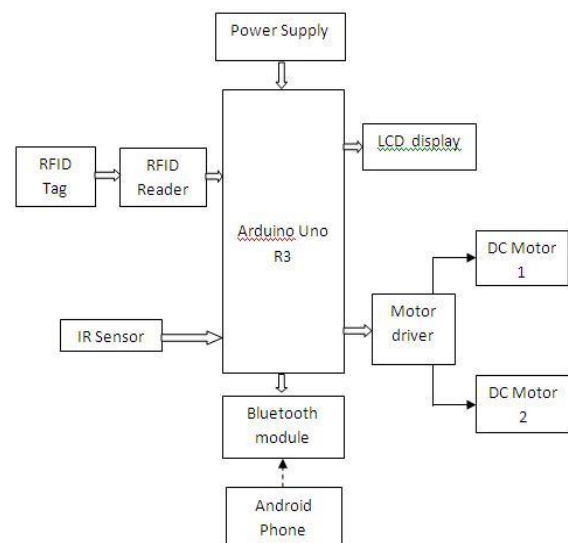


Fig 1: The block diagram of Automated Smart Trolley



Fig 2 The proposed Smart Trolley

#### 5. REQUIREMENTS

- Arduino Uno code
- Bluetooth controller application
- Arduino Uno
- DC Motor

- Bluetooth module hc05
- Motor driver
- IR Sensor
- RFID reader, RFID tags

## **6. RESULTS AND DISCUSSION**

The proposed methodology replaces the simple bar code technology because 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 sturdier than the bar code which costs more due to heat, liquid, physical tear, roughness 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 placing a product inside a trolley that is not scanned. The tracking of count of products using IR sensor placed inside the trolley aids in protecting the theft of the products and taking away products that are not billed unintentionally removing a product can also be done perfectly with the push button which guarantees customer that products can be removed whenever he changes his mind. The product catalogue display feature enables the customer for easy search of products without any difficulties. The GSM module sends time to time information to the customer mobile for flawless warning about his shopping activities.

## **7. CONCLUSIONS**

This work presents a modification in purchasing technology as per the customers need and satisfaction. Clearly RFID has richest of barcodes by its accuracy, fast response and durability. This proposed work eliminated the ordinary purchasing method and billing system and made easy for shopkeeper for acquiring information about products. Billing is completely avoided which in turn saves time for the customer and makes process straightforward for shopkeeper. It avoids queue for customer since billing is completed in the trolley. It reduces one third of the overall investment of the shopkeeper for billing department. Thus the model allows better shopping experience using improved technology which can be handled by any common man who just knows to read and write things. Future advancement is to use enhanced RFID readers that operate in high frequency which can read multiple tags simultaneously Mobile application can be developed to avoid smart card and GSM. Inventory management can be incorporated using IoT which in turn helps in automation of stock management.

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