

Smart Shopping Trolley

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Abstract: We introduce a low cost, easily, scalable system for assisting customers in shopping. Most of the supermarkets use the barcode based product scanning technique which requires additional time and manpower. The RFID technology enhances the overall shopping experiences due to its significant advantages over existing barcode system. The RFID reader is attached with the trolley so that the customer can scan each item and can access the product information, product features, and discounts. The system provides location of particular item, if the user unable to find the location. The system detects the expiry date of the product and alerts the user. It also provides product suggestions based on the customer's previous purchase and also popup the current offers. The customer can pay the bill using pre-recharged card or net banking.

Keywords: Machine Learning, RFID Reader, RFID Tag, Recommendation System

I. INTRODUCTION

Nowadays people find it easier to ordering online than going to a retail shop, so that the business owners need to come up with new technologies to improvise shopping experience. Today every supermarket provides trolley that are used to carry their purchased items throughout the entire shopping process. In most of the shopping centres or supermarkets, people faces that a problem of finding right product, and spending too much time in the queues for billing their purchases. Sometimes the long queues may create misunderstandings and conflict among people, especially when someone breaks the line or stand in front of people.

Today almost every supermarkets use barcode system to identify products and generate the final bill. Barcode contains a series of vertical lines having different thickness and separated in a distance. Every product is uniquely identified by these codes. When shopping finishes the customer approached to the bill payment section, where each product taken from the trolley is manually scanned in the barcode scanner. So that scanning time grows gradually if there is plenty of a purchased product. Most of the department stores follow this procedure. After innovations happened in smart trolley system such that the barcode reader is placed within the trolley thus making the normal trolley as smart shopping trolley. It also eliminates the need for manual effort at cashier counter. Later the LCD display was included to the trolley so that the customer can view the total amount as he scans each product. This mainly helps the user in purchase decision making. The existing Barcode system stores all the information about a product in the database, so that the product identification is an easy process. The main problem with this system is that it requires optical line of sight scanning. It doesn't have read/write capabilities and it also susceptible to environmental damage. If the barcode is scratched or crumbled it may cause the problems while scanning.

RFID is the radio frequency identification technology that uses radio waves to automatically identify people or items. Most widely usage of this technology is as the RFID tags and RFID readers. RFID tags support more set of unique IDs and additional information than the barcodes. It also provides a smart system by eliminating most of the human assistance especially the checkout counters in the supermarkets. The main purpose of our purposed system is to provide a RFID enabled smart shopping trolley along with product recommendation. The system is designed for both regular and normal customers. The smart card is provided for each regular customer so that they can pre recharge that for purchasing. The system displays purchase list during purchase and popup the offers/discounts. User will be get alerted if there is any expired product in their purchased item. Based on their purchased history the product recommendation list is provided in the LCD screen. At the end of purchase the purchase details send to the server and generate the final bill. The customer can pay the bill through net banking or deduct from smart card

II. LITERATURE SURVEY

The radio frequency identification Technology has a key role in handling manufactured goods and providing efficient services. Unlike other Technologies like a barcode the RFID doesn't need Line of Sight for the identification of materials [1]. The products are uniquely identified by using RFID tags. There were mainly two classes of RFID



devices: active and passive. Active tags either connected to a powered source or use stored energy in a battery. Passive tags not require batteries or maintenance. The RFID reader is responsible for powering the tag and communicates with the tag. The tag antenna receives energy and transmits the unique tag ID. An important feature of the modern RFID is that the tag can contain more information. Due to its potential benefits RFID can be used in many applications.

In this paper [2] the system designed in such a way that it will minimize overhead of wireless communication among devices, because the processing is done locally. In most of the systems the incomplete information about products on sales and wastage of time on billing counters are main problems faced by the customers. To overcome these problems the proposed system were designed by attaching barcode reader and strain gauge on the shopping trolley. The barcode scanner will scan the products and determine its price from the database. The database contains all the information about the product and is stored at the payment counter section. A load cell is used to detect its output for the decision making process in the trolley. If there is a case of discrepancy the weight of the product obtained from the load cell not same as the actual weight of the product. The zigbee module chosen here is easily available one. Finally the customer proceeds to bill payment section to pay the bill. If there is any discrepancy activity then a store employee assist the customer. The system fails to produce correct result if the lighting condition is very poor. The processing time is decided by analyzing the time taken by the cart to generate the decision and time for communicating with the bill payment section.

Innovation of new technologies such as barcode reader as mentioned in [3], will make shopping process faster. The barcode reader is an optical scanner that detects items by reading the barcode. Barcode scanner is easy to use, because it doesn't need any kind of training and employees can easily understand its functionality. Shopping system with barcode reader for product identification needs a line of sight between product and items. In the proposed system the barcode reader scan the barcode, decode it and send data to the computer. Here the customers will be able to scan each product themselves. A LCD display is provided with the trolley. So the display keeps information about price. It continuously updates the total whenever the customer purchase product.

The main purpose of proposed system in this paper [4] is to provide a low cost, scalable and technology oriented system which assists the customer. There are three key components: motion control components which are used to follow the user and obstacle detection, automatic billing component, user interface and display component. For completely eliminating the billing counters and cashier less system internet banking and credit card facilities are provided. Here the author introduces a pocket device to customer where accelerometer and a transmitter circuit are attached to it. The accelerometer gives signal output three directions x, y, z. Here we will measure z and x axis continuously. There is no relative motion present in y-axis so neglect it. These readings are feed to the microcontroller by the receiver and move the trolley accordingly. Throughout the process the orientation of the trolley will be same, because the system uses Omni wheels. The obstacles are detected by using ultrasonic sensors. When the sensor detects any of the obstacles, it can know the distance to that obstacle. By using this trolley keeps a proper distance from the customer and also racks in order to avoid collision. The automatic billing system is work as a normal RFID based shopping trolley, where RFID tags are scanned and purchase information displayed on screen. At the end of purchase the total bill data transferred to PC by using wired modules in the billing counter. Here the billing counter is not totally eliminated.

As mentioned in [5] Radio Frequency Identification technology uses radio waves to transmit data from a RFID tag attached to an object to the reader. There is an inbuilt embedded chip along with loop antenna exist in the wireless card called as RFID tag. The RFID readers, microcontroller and physical media start working when user press start button. The RFID reader reads tag then the corresponding information is displayed on the LCD screen. When the user finished the shopping the total bill is send to master PC. At the end of the shopping the customer can straight away to pay the bill. This system updates the inventory status at the end of the shopping. The research is conducted among staff, customers and suppliers. The research involves questionnaires distribution and interviews. Three elements tested in the research which covers on spending time, budget control and product layout. The importance of smart trolley implementation is enhanced by using the information of those elements.

In this paper [6] traditional billing system is improved by designing a smart trolley which uses RFID technology. As mentioned in the previous sections this system also uses RFID tags which is attached with every product in the supermarket. It has a unique Electronic product code that provides info like name, price etc. about the product. ARM7 microcontroller is used. When the product is scanned by the RFID reader, the unique code send to ARM processor. The information about purchase is getting displayed on the 16x16 character alphanumeric type LCD display. The LCD display is interfaced with microcontroller which used to indicate every action taken by the customer such as insertion and removal of item, price of item, and total billing cost. The bill payment is through credit card system, where customer needs to enter credit card number and mobile number. When the bill amount debited from the account it is



notified through SMS. This total bill that is transferred to the billing counter PC through wireless zigbee transmitter, then PC receives billing data and starts bill printing.

The aim of the system in the paper [7] is to supporting shopping by acquiring user attention. It will guide and directs the user for handling the groceries. Working of the entire system as the normal RFID based Shopping Cart. The shopper receives the promotional message while shopping. User can create shopping list using freeform natural language. The design consists of four components such as hardware integration, software interface, wireless communication and network database. The user is able to see the product details also compare the value of similar products. The navigation support available for the users which designed considering several facts like spatial relationship between products and trolley, trolleys and shelves, and the items on the user's shopping list presented with an icon is also used to represent in the map. Here still needs a cashier because it has cash payment option and also a hard copy of the bill receipt is provided by him.

A shopping trolley attached with ultrasonic sensor for obstacle detection [8] is an improved version of the existing smart trolley system. It provides an automatic human and line following shopping trolley which can track the purchased items easily. The system is a three wheel vehicle with trolley mechanism, where we put the purchased items. It has a drive and steering mechanism. The human following system is implemented by using IR emitter tag which when shown to the trolley will get activated. This tag will stick to the person and trolley will continuously sense in order to track that person. As the person moves, the steering mechanism will follow the direction as per the emitter to drive the trolley in the required direction. When the user out of the way the scanner will scan surroundings to track the user. When it can't sense the user, it will produce a buzzer sound or any recorded sound calling the corresponding person's name. In such situation the user can reach back the trolley and reactivate it. It also produce a buzzer sound when there is interruption in between the scanning area, then resume operation after the obstruction moved away. Through this system users can enjoy shopping without pushing the trolley. But it only reduces the user's physical movements. It doesn't reduce the manpower and also do not provide facility for the cashierless system.

In this paper [9] we introduce a system "intelligent shopping cart" based on RFID for improving shopping experience of customers. The main goal of this proposed system is to provide low cost, scalable, efficient mechanism for electronic shopping. The system contains 3 key components (a) server communication component (SCC), User interface and display component (VIDC), and automatic billing component(ABC). Each component has specific functions. Here SCC is for establishing connection of the shopping cart with the main server. VIDC provide user interface. Automatic billing component handles the billing section. The main objective of this proposed system is the usage of RFID technology for the automatic identification of products. Nowadays RFID technology is commonly used for the automatic billing systems, this is because it is more resistant, safer, and also they identify products in unique way. Simultaneous processing of products is allowed in RFID technology. Intelligent cart consist of RFID reader, microcontroller, RFID tag and a zigbee module. Proposed system helps customers to track product. There will be a LCD display which shows the updates about the customer purchasing.

In this paper [10] the authors designed a smart trolley system using smart phone and arduino which provides the facility to those customers who have membership cards with supermarkets. The trolley has two modes of operations. If the card is inserted into the system, it will work as a smart trolley otherwise it will work as a normal trolley. Here customer's smart phone act as the barcode scanner. For this customers need to install a mobile application in their smart phone. Whenever the smart phone camera near to the barcode, it will decode the barcode and the code will accept by arduino Uno through Bluetooth module. When the user finishes shopping and near to billing counter, user need to press button on trolley and data displayed on LCD display would transfer to the computer. Then the user can pay the total bill in the cashier section.

Several technological solutions have been developed to overcome the issue faced by the customers. Each solution improvises the effectiveness of the developed system. In this paper [11] the visible light communication is used. LIFI replaces the wireless standards such as zigbee, Bluetooth etc. The proposed system consists of atmega32 microcontroller, RFID reader and tag, LIFI transmitter and receiver, Android application, server PC. Each and every product in the supermarket is uniquely identified by an identification number through RFID tag and LIFI TX attached to it. When the customer purchases an item and put it into the trolley, the product information is transmitted to server PC when it read by reader, through RF TX and RX. As a result the product purchase details such as name, price of products are displayed on the screen. This information from trolley can be transmitted to main computer in billing section. User can pay the bill using any payment method. The advantage of using LIFI technology is that it simplifies the billing process and increase security.



In this paper [12] developing a new system by adding additional features to the existing systems. There is a billing unit and trolley unit. The billing unit includes PC server and Wi-Fi module. The trolley unit contains Raspberry Pi connected to camera, LCD display, and beeper. Software called SambaFile server is used for the networking purpose, to share files between Raspberry Pi and other devices like PC. Here three techniques are used such as barcode detection where barcode lines are being decoded and detected, pattern matching where we learn the ID of all the products and store it into database. Then pattern matching is performed by analyzing the newly identified ID and already stored ID. The customer need to place the product in front of the camera so that the camera captures the image and transferred to the Raspberry Pi. This module sent this picture to PC. This picture will be kept in particular path on the PC. The decoded barcode is compared with the Stored IDs. When a match is found, the product information like name, price, and weight will be send back to the Raspberry Pi module. The corresponding information gets displayed on the LCD. Whenever the user add a new product or remove a product the LCD will be updated by transferring appropriate information. But the user can only remove the last product in the list. The shoplifting was avoided by comparing the weight of the trolley and the total weight displayed on LCD. At the end of purchasing user can pay the bill without waiting in the queue.

This paper [13] presents a system for improving shopping experience by providing features like locate items, billing them and store each transaction, purchase history for future reference. Here Android application is created which need to be installed in the user's smart phone. The users need to register by providing name, contact number, email id, and address. When the user is inside the store the app works in online mode otherwise it is in offline mode. In online mode the user's smart phone is connected to store's Wi-Fi and open the app. Now the user can scan the items and finally pay the bill either in cash, card or wallet. The invoice copy is sent to the user's email id. In offline mode the user can prepare the list of items that he want to purchase, view the offers, and purchase history and update the wallet but can't make purchase. The shop owner can keep track of the number of users visited the app in online mode. A copy of generated invoice at each purchase is kept in record. He also can manage stock availability in the store but the system doesn't provide proper facility for theft control. The user needs to connect to Wi-Fi then only the purchasing is possible.

New technologies are introducing to enhance shopping experience. To minimize customers waiting time and disappointments and get more comfortable retail shopping, Bansi Tani and Asst.Prof. Divyang shah [14] come up with new techno enable shopping Cart which has the concept of Near Field Communication (NFC), Radio Frequency Identification (RFID) with the Internet of Things (IoT). The system consists of two parts one is transmitter which is place on reader and other is receiver at server side. The transmitter section contains microcontroller, LCD display, NFC reader, serial Wi-Fi and push buttons. The raspberry pi as an internet gateway is used in the receiver end. USB Wi-Fi LAN card receives data from the Wi-Fi module. Here every trolley has a unique ID, which is used by the server to uniquely identify each trolley and NFC tag to uniquely identify every product. The system and its components start working when user press start button. Now the shopper can place the product near the NFC reader. A push button is assigned to each task like add, remove or cancel event. When the key is pressed by the user it will send information to server containing the button pressed, trolley number and product identification number. The bill information is updated whenever user removes the products. The user press finish button indicates the end of shopping. So that final invoice is send to the server. Consumer can pay the bills using net banking or by cash payment. As compared to the older system people experience the better facility, fast checkout. But here manpower is not completely reduced and also the components are expensive.

This paper [15] is also designed for customer convenience. The proposed cart system provides the functionality of combined components such as a website developed for Store, Electronic smart cart system and Anti Theft RFID security Gates. It is a combination of components like OLED display, arduino Mega 2560 board, PCB, Wi-Fi module, 13.56 MHz HF RFID reader, power supply on an embedded electronic hardware. The customers need to create an account in the market website and transfer some cash into this account. All these information is stored in cloudant database. After the account creation user will get a personal id card from the store, so that whenever the user need to purchase items he simply swipe the card and authenticates him selves. User can purchase items by scanning the RFID tags. The scanned products information is transmitted to the cloudant database, which retrieves all the required information on the OLED screen. By seeing the cost details of each purchased item we can decide whether to purchase a particular item or not. However the customers need to delete the item manually. When user finish the shopping, just press the pay button so that the Purchased product information will be sent to cloudant database. The corresponding total amount will get deducted from account. Now the customer can leave the store through Anti Theft RFID security Gates. If there is any theft activity encountered there is appropriate alarm which will notify that to security staff. The system uses IBM cloudant database, commercially available cheapest Wi-Fi modules and cheap RFID reader. However the system doesn't mention any method to describe what to do if pre recharged amount is not sufficient to pay the total amount.



The main aim of smart shopping system [16] is to minimize the manpower and satisfy customer by reducing time consumed for billing process where customer need to wait in the long queues. Here technique used is the automated billing for customer during shopping primarily based on RFID, along with some other technologies. The system setup includes the RFID reader, IR sensor, door with motor, relay, GSM module, LED, CLCD, keypad and a push button. These modules are functioned in combined manner. To uniquely identify each customer a RFID card is provided. Entire system starts with the customer authentication through scanning RFID card. If it is an authorized user then he can start the shopping. If the authentication failed then the card gets locked and through OTP he can recover the card. The authenticated user can view the product catalogue. When the user starts scanning of products, the display will generate the corresponding purchase details. The parallel sensing of IR sensor will keep track of the count of scanned products. When user finishes the shopping the total amount will be displayed on the screen, which can be paid through the smart card or debit/credit cards. The invoice copy is send as text message using GSM module. This method is efficient because it replaces the barcode system. RFID tags are more durable, accurate and password authentication provides security. But there is no technique to automate the stock management in this system.

As mentioned in the previous section, this paper [17] also describes about the smart shopping system based on the RFID technology and smart rechargeable card. The RFID reader provided within the smart trolley will send the scanned product information to the microcontroller. Here when the customer finishes shopping, a button is pressed which will lead the customer to the payment section. Now the customer will put the smart card into the slot. The display will show the total amount available, and deducted amount. The entire processing information is transferred to the central PC. It will totally eliminate the need for waiting in the queue for the bill payment. But the customer need the smart card in order to purchase items. The system still supports the cash payment option which requires the cashier.

As compared to other Technologies the RFID get wider acceptance by Business industry. The UHF RFID tags are used in this proposed system [18]. The UHF RFID provides high accuracy for the readings. Here reader, antennas, user interfaces are integrated to the Shopping Cart itself. The components are integrated in such a way that it has low cost and low power requirements. The system installed with self checkout facility and track product's stock and item level information is provided to users in real time. When the item count lowered to zero the distributor get notified about that. Before using the system the customer need to register by providing name, mobile number, email id and password. When the user log into the system the username and password will validate and allow the user to log into the system. Now the user can scan the card which is provided to him during check in. When the scanning process completed the user will be navigated to the home page containing menu like add item to cart, remove item from cart, display the bill, pay and check out and exit. The user can add items to the trolley by simply selecting the add items to cart option, and then scanning the RFID tag attached to the product. If user wants to remove an item, he needs to scan that item. If the item is present in the trolley the system popup a message saying that the item removed otherwise display appropriate message. User can view the bill details and after paying the bill through checkout process user can check out.

There is a considerable progress in gesture recognition and speech recognition methodologies, which in turn bring life to many of the human-computer interactive systems. In this paper [19] presents a concept of a smart robotic trolley for supermarkets. The architecture of proposed robotic trolley has three different channels such as acoustic voice input, sign language input, touch screen input. The important hardware and software modules are speaker independent system of automatic continuous Russian speech recognition, speaker independent system of Russian sign language recognition with video processing, an interactive graphical user interface with a touch screen. All these modules are work simultaneously and synchronously. All these components provides features like understanding voice commands, understanding Russian sign language commands, escort the user to a certain place in the store and speech synthesis where synthesis of answers in Russia sign language using 3D Avatar. The model training process needs a representative database, so we have to create a robust sign language recognition system. The reliability and accuracy of audio based speech recognition system and sign language recognition system depends directly on the quality of training data. So the author focused on to create robust SLR system for supermarkets by collecting a representative Russian sign language database.

The automated billing system in [20] uses RFID along with Zigbee communication. The Zigbee provides low cost and low power connectivity for equipment. Every cart contains PID (product identification device). PID contains a microcontroller, LCD and RFID reader, EEPROM and Zigbee module. There is a centralized database which give product recommendation. An RFID tag is attached to every product. Each cart will have an RFID reader and Zigbee Tran receiver. There will be online payment procedure for billing. The anti theft concept implemented by using RFID reader at the exit door. By analyzing the customer shopping patterns/habits offers/discounts are displayed on the screen. So that the entire system helps the customer in their purchasing.



In this paper [21] the smart shopping trolley is implemented by using the Raspberry Pi controller. A server integrates all the components like IR sensor, RFID card, LCD display, Wi-Fi module, Dc motor, RFID reader, and a web application along with Raspberry Pi module. The customers need to have an account in the specified web application. Before using the system customer have to swipe smart membership card then login to the webpage. After this process customer can simply take each product from the rack and scan it using RFID reader then put it into the trolley. Raspberry pi module will send this information to the server by using Wi-Fi module. The server will store all the information about the purchase. The web application will calculate the total bill and is displayed on the web application. Now the customer pay the bill. If the mode of payment is through the online wallet then he has to swipe the membership card again and then the corresponding deductions from the account will happen.

RFID systems are still efficient but it found to be costly. The QR codes which is short for Quick Response code used by the retailers at the purchase and sales sectors [22]. Every item has a specific QR code. Customer need to install an app. When the user enter into the shopping mall scan the QR code on the entry door, where a unique QR code is assigned to each customer. When QR code assigned to customer, product purchasing can be started. Customer can place order by scanning QR code of products. He can also select the products from the previous list. Finally customer clicks on Bill generation, so that the unique trolley ID which is assigned to each trolley will be connected with QR code of the customer. The trolley will move to each stall, now the stall keeper will put the product on the trolley then it will move to the next one by one. When the customer tap checkout the smart trolley will reach the cash payment centre. The final amount will be notified to the customer along with discounts/offers. The trolley will reach on billing section only after the checkout process. The customer can pay the bill and collect products. In this system number of trolleys required is reduced. But the payment section is still a little difficult process, because there is a need to wait in the queue.

In this paper [23] the shopping cart assist the customer based on the purchase history and also recognize customer. Each product has a RFID tag that helps to automatically detect the products added to the cart. Each and every shopping data is transmitted to the cloud server of shopping mall. The smart shopping cart based on the powered motor and also including several devices like laser scanner and RFID tag. The system uses embedded computer for motion control as control unit. This functionality is implemented in tablet computer and also in embedded computer. It uses c based language and lab VIEW. The product searching, map information and automated billing are provided by the user interface of SSC. The system also provides face recognition. The customer clicks the login option then turn the camera will photographs the user image and start the face recognition process. If a match is found the details about the customer is displayed on the screen.

In [24] the intelligent shopping trolley based on IoT and sensor fusion. This intelligent system provides the automated billing and also the automated payment. The introduced system is fully automated. That means the customer can control the shopping trolley itself. By using an accelerometer control the shopping trolley from the beginning of the shopping to till reaches the parking area. The intelligent shopping trolley supports all kind of payments such as debit/credit cards, net banking and also wallet. The arduino mega and sensor network are the main components of the system. The users can access data remotely through android application.

This system [25] consists of an arduino, which installed on the cart and two motors, RF transceiver and three ultrasonic sensors. The distance between the cart and customer maintained by ultrasonic sensor, who accessing the cart. Based on this distance microcontroller takes the choice of whether pressure to motor or not. The microcontroller consist of output degree of sensor, it decide the cart runs or stops. The cart is connected to one RF transceiver, which works as transmitter to send out the details from sensors, the other transceiver is placed on the customer as a tag. The arduino receives the incoming signal, and decide whether to alarm the customer. Each product has a RFID tag, which read by the RFID reader and prints soft bill. The payment is done by using smart phone. The RFID system provides a smooth shopping experience.

The automation of shopping cart [26] avoid the time delay in the billing process. It mainly uses the RFID tags instead of barcodes that attached to the products. The customer takes the product and is put into the cart. The RFID reader read the price and all the details then is displayed on the screen. There is no need of any human efforts. Here we use a GSM transmitter that transfers the data into mobile. Using the mobile, the smart trolley app, the amount will be sent and the payment will be done. It mainly based on the mobile app. It uses a PIR sensor, which allows you to sense motion. If there is any item that user want to remove from trolley, just press the * button and is taken away the product.

In all of the smart shopping systems the trolley is directly handled by the customers just like a normal trolley. RFID based system have great advantage when they used in smart shopping trolley. At the same time they are expensive if we consider the component level cost, like cost of RFID readers, maintenance cost, replacement cost in case of any damages are high. This paper's [27] design enable the customers to scan both moving and stable products within the

shopping area. This is done through 4 layers such as reader layer, edge layer, network layer, and information system layer. The main objective of the system is to develop a system with reduces implementation and maintenance cost along with ease in integration and provide user convenience.

In this paper [28] a low cost, robust technology implementation such as passive UHF RFID were used to make a shopping trolley as smart shopping trolley. It provides efficient and most accurate shopping information so that it can be easily implemented in department stores. The real time information is provided to the customers by attaching multiple antennas within the trolley. In order to read the tag in various orientations, a circular polarizes antenna is used. The passive UHF RFID tags are based on the transmitted power from the RFID reader. When tag is within the range of RFID reader, tag antenna will activate the IC by the transmitted signal from reader. The receiver antenna now obtains the product information and sends to the FRID reader for processing. The main advantage of this system is that it can works with multiple antennas at the same time inside the trolley. The RFID system doesn't need line of sight ability and also used for both near field and far field applications. The UHF RFID tags also have higher data rates and it is globally standardized. As a normal case the tag ID is difficult to read in metallic presence, but the UHF RFID tags can be use even in the presence of metal and liquid. One of the drawback is its cost, but compared to its advantageous parts it is most preferable for smart shopping trolley system.

III. CONCLUSION

In this paper successful use of UHF RFID system for the smart shopping trolley has been demonstrated. Each item that put into the trolley can be detected. It uses passive UHF RFID tags that are low cost compared to active RFID tags. The proposed low-cost, robust UHF RFID based shopping trolley system allows tracing and processing of data in real time. RFID Technology replaced barcode due to its drawback where barcode require the line of sight and should be placed in exact boundary during scanning. There is no technique to measure quantity of the product within the trolley. These were the drawbacks of previous shopping trolley system which were overcome in this application. The system also checks expiry date of product and alerts the user. We will send the bill and other details of the product to the local server where all the information will be saved and that information will be useful for the inventory management. The system provides product suggestions based on the customers previous purchase using the machine learning.

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