Survey on Smart Shopping Cart

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Abstract- In the present technology in which most of the customer needs to wait in queue in the supermarket for shopping because it is very much time-consuming process. A huge crowd in the supermarket at the time of weekends or discount times makes trouble to wait in long queues because of the barcode-based billing process. In this regard, the Internet of Things (IoT) based Smart Shopping Cart is proposed which consists of Radio Frequency Identification (RFID) sensors, Arduino microcontroller, Wi-Fi module, and Mobile application. RFID sensors depend on wireless communication. One part is the RFID tag attached to each product present in the store and the other is RFID reader that reads the product information. After this, each product information is displayed on the Mobile application. The customer easily manages the shopping list in Mobile application according to preferences. Then shopping information sends to the server wirelessly and automatically generates billing. This experimental prototype is designed to eliminate the time-consuming shopping process and quality of services issues. The proposed system can easily be implemented and tested at a commercial scale under the real scenario in the future. That is why the proposed model is more competitive as compared to others.

Indexed Terms- Smart trolley, Arduino, ESP8266, Trolley, RFID Barcode Scanner, RFID Tag

I. INTRODUCTION

In this project the intended system design for the automation of the shopping process by merging various technologies like Arduino Uno, RFID, and Android mobile application. That can be divided into two major categories electronic components and Software components. In Electronic Components, Arduino Uno operating as an intermediary microcontroller, which controls the RFID technology and built, communication between RFID technology and software components like android mobile application through Wi-Fi module. In software components, there is an android mobile application in which customers login to the proposed system by using different proposed methods that can secure customer privacy. The proposed system prevents the customer to get an expired or undesired product by providing an android mobile application. Customer directly interacts with the product information. This information affects the preferences of the customer about the product and helps them to get the best quality product. Shopping products can be displayed in a current shopping list of the customer that helps the customer to maintain its shopping list according to need or budget.

That also helps to remind the remaining products to purchase. Besides, there is a server as a data center of the supermarket, which also connected with the smart shopping cart. When an android mobile application needs to extract data from the server, according to the customer information for verification of the customer login or extract information of the product according to the product RFID tags, then the mobile application can communicate with the server wirelessly. This feature of wireless information extraction helps the customer to move freely and can easily interact with information of products anywhere in the supermarket. Those technologies are programmed to work together to entertain the customer most efficiently. By using proposed technology customers can effectively get the best quality product. As a lesson receive a proposed system can easily be implemented in real-life scenarios to support the shopping process by automation of shopping cart.

II. PROBELEM STATEMENT

The merchandising process is the major part of the supply chain management that promotes the products

to the consumers and distributors. Shopping is the activity in which a group of people uniting at one place or purchasing products. There are supermarkets or shopping malls that provide space for people to do shopping where retailers promote their products to the consumer and consumers purchase the product according to quality like ingredients, expire or not and brand of the product, reasonable price, and quantity of the product. This is also known as traditional retailing. Supermarkets are convenient for retail and urban planning.

Supermarkets are the most crowded place at the time of the weekend. As most consumers have experienced, the basic steps involved in shopping are making a list, typically with pen and paper or on their mobile phone. They have to spend a lot of time in search of products in the whole supermarket one by one and spend time in long queues to pay bills. The waiting in-queues is negatively affecting on human morale and may cause misunderstandings or conflict amongst people, for instance, when someone breaks the line and stands in front of other people. That is not an ideal development because traditional marketing promotes many local jobs, city life, and urban culture. The supermarket also needs to personalized the inventory according to consumer preferences.

Due to that online shopping attracts a large number of consumers that provide products through the internet and web browsers. Consumers can receive the product from specified locations in the meantime by selecting products according to prescribed specifications, ingredients or instructions. Also, there is higher risk of fraud, lack of inspection, item may not work properly or defected, not be the same product as item pictured, transaction from stolen credit card, Phishing in which customer thinks that they purchase product from reputable seller, disruptor in retail industry and not provide the pricing negotiation.

Instead of online shopping, people feel more valuable, entertain, enjoy and get the quality product with traditional shopping. In these critical situations, traditional shopping and supermarkets have to reinvent to survive in the current age. Shopping hubs or shopping malls are the places were several small business groups together known as a market.

III. LITERATURE SURVEY

People have consistently imagined and built up an innovation to help their needs from the start of the humanity. The main reason for these innovations has been limiting errands and making the regular tasks quicker and simple. A task on which people are discovered spending significant measure of time is going for shopping and purchasing the products needed. In olden days we used manual billing using pen and paper then we started using the barcode system but after some years it also started to have issues like LOS (line of sight), increasing queue etc. So, to overcome this issue a concept of smart shopping with RFID technology was proposed

Paper [1] describes the implementation of smart shopping cart using radio frequency identification using the RFID sensors, Arduino microcontroller, Bluetooth module, and Mobile application. Where the mobile is connected to the shopping cart and the application is already installed, the data is shared using the Bluetooth from the arduino microcontroller and the mobile then with the server.

Paper [2]" Intelligent shopping cart using BOLT based on IOT". IOT kit consists of barcode scanner, LCD display, Bolt ESP8266. The broad clarification of its process is, when consumer takes an item and put inside the trolley, that time barcode scanner scans the item barcode and value as well as gain to show into the digital display panel. Later than consumer concluded their purchasing and the bill is sent to the counter section.

Paper [3] "Smart Trolley with Instant Billing to Ease Queues at Shopping Malls using ARM7 LPC2148. This is based on arm7 microcontroller fitted with an LCD and RFID scanner and a wireless technology called zigbee. The LCD used is a 16x2 and zigbee modules make the wireless network to work even at long distance due to its wide range, the RFID scanner scans the product's unique code and its price. And it gets displayed on the LCD screen. So, after costumer has finished with the shopping, he/she has to visit the counter and pay the bill as displayed on the LCD screen fitted on the trolley.

Paper [4] EM-18 RFID scanner module has been used. It uses a RFID reader which will read 125 kHz tags. So, it will be known as a low frequency RFID reader. The RFID Readers here used are big tags with range of 125KHZ which can be detected by EM-18 Module. It shows the real time billing and you can even delete the item you don't want by pressing the delete button. In this author has used ARDUINO Uno which one of the cheapest and most efficient models in the market. It contains everything required to support the microcontroller merely connect it to a laptop (or applicable wall power adapter) with a USB cable or power it with an AC-to-DC adapter or battery to get started. Once the item is scanned it will start billing and you can remove the item if you want.

Paper [5] Framework is utilized to ease lines in shopping centre by utilizing RFID module. The RFID reader will peruse the RFID Tag set on the item when the item falls in the trolley. In the event that, the client needs to expel any item then he should expel that item from the trolley. The LCD will show the subtitles of the expelled item like name, cost and the absolute bill and with the help of Xampp server the bill will be send to the cashier

Paper [6] describes the implementation of a Smart Shopping Cart using ZigBee networks. The reliable and cost-efficient system design also ensures detection of deception. Thus, the smart system attracts both the buyers and sellers and ZigBee acts like Xampp server but is more reliable.

Paper [7] Automation of shopping cart using RFID module and ZIGBEE module, in this system, RFID tags are used instead of barcodes. These RFID tags will be on the product. When the customer takes a product and places it in the trolley, the trolley will contain an RFID reader which will sense the RFID tag which is present on the product. Thus displays the product price on the LCD display. Like this, the process continues. Along with it, comes a ZIGBEE transmitter in the trolley, which transfers data to the main computer. The ZIGBEE receiver is placed near the main computer which receives the data from transmitter.

Paper [8] designs a shopping cart by taking inspiration from a shopping basket which is under development

by Panasonic, in which each item is tagged using UHF RFID [range: 916-924 MHz] Two Circular Polarized (CP) Patch antennae used to read RFID tags in different orientations. CSL 468 RFID reader used having 16 ports and scan speed of 300 tags/sec

Paper [9] Smart Shopping Cart with Automatic Billing System through RFID and ZigBee, this application creates an automated central bill system for the mall. Customers can pay their bill through credit/debit cards. Zigbee and RFID used for in it.

Paper [10] This framework is utilized as a part of spots, for example, general stores. It can help in diminishing labor and in making a superior shopping background for the clients. Rather than influencing the clients to hold up in a long line while looking at, the framework robotizes the charging procedure. The client can likewise track the subtle elements of the acquired things and additionally the present bill sum on the screen.

IV.   PROPOSED METHODOLOGY

The main focus of this study is to facilitate both supermarkets and customers. The proposed Architecture of this study provides the hardware and software solutions that help the supermarket to improve the quality-of-service issues and eliminate the time-consuming process of the shopping. The retail industries invest further in exploring the potential of these technologies for the novel services for their customers. These novel services attract a huge number of customers that increase revenue as well. The innovation of the proposed study is the architecture model and services that come together to provide eco-friendly services in cost-effective manners.

Our proposed system will allow customers to interact with the products, The customer can also get his/her previous shopping history, the shopping list management modules are added to the Mobile Application which help the customer to manage the shopping list and get the best product according to his/her preference. This experimental prototype is designed to eliminate time-consuming shopping process and quality of services issues. The proposed system can easily be implemented and tested at a commercial scale under the real scenario in the future.

That is why the proposed model is more competitive as compared to others.

RFID system embedded with a shopping cart that helps the consumer to purchase desirable and cost-effective products. As mentioned above, an RFID system consists of three main parts RFID reader, RFID electronic tag and central communication device. Arduino microcontroller allows the android application to directly communicate with product information that is stored in the RFID product tag. There is an android application based on a user-friendly and attractive display connected with the RFID system.

This application provides services to the consumer i.e., display the product information, previous shopping history, manage a current shopping list, product promotions, special offers and RFID based login process for better security. When products come near to the RFID reader in the shopping cart. The consumer can interact with product information.

This information extracted by mobile applications from backend databases stored in the server system. The consumer can also interact with previous shopping history, product promotions, and special offers. That helps the consumer to remember products to purchase, manage shopping list and can get the best products according to the preferences.
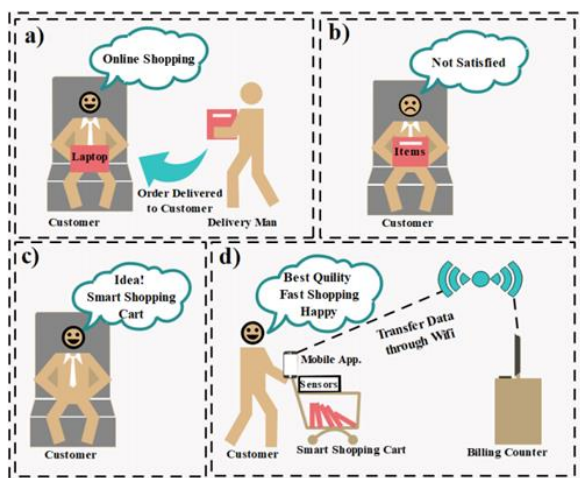
The customer can check the cart in the android application to go through the products which are purchased till now and they can see the grand total of the purchase and get to the conclusion based on the budget and buy any more products they need within the budget. When the customer as purchased over his/her budget then he\she can delete the product in the cart present in the application and remove the product from the trolley and the bill will be computed again. When the customer is completed with the shopping, they can head to the cash counter and provide their unique ID to the cashier person, by using the details he gets the purchased cart details from the server and carries out the payment as per the customers wish like cash, credit/debit card or UPI mode then the cashier generates the hard copy of the bill to the customer and the customer can leave mart with no time easily.

CONCLUSION

In the aforementioned paper, the intended system design for automation of the shopping process by merging different technologies like Arduino Uno, RFID, and Android mobile application. That can be divided into two major categories electronic components and Software components. In Electronic Components, Arduino Uno operating as an intermediary microcontroller, which controls the RFID technology and built, communication between RFID technology and software components like android mobile application through Wi-Fi module.

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verification of the customer login or extract information of the product according to the product RFID tags, then the mobile application can communicate with the server wirelessly.

This feature of wireless information extraction helps the customer to move freely and can easily interact with information of products anywhere in the supermarket. Those technologies are programmed to work together to entertain the customer most efficiently.

By using proposed technology customers can effectively get the best quality product. This proposed system can easily be implemented in real-life scenarios to support the shopping process by automation of shopping cart.

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