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A Survey Paper on Automated Customer following Shopping Cart and Billing System

Nikita Jagtap[1], Sai Paulbudhe[2], Aniket Bable[3], Neha Sathe[4]
[1, 2, 3]*CSE Department, MIT-WPU Pune*
[4]*Assistance Professor, CSE Department, MIT-WPU Pune*

Abstract: ***India is one of the fastest growing economies in the world and aspires to become a 5 trillion dollar economy. E-commerce has surely spread itself and there have been much advancement in this field. The working class and most of our community prefers to go to malls or supermarkets and get their shopping done. Due to increasing populations, shopping is a cumbersome process. The major problem lies with the traditional system as one has to wait in long queues to get their processing done. Clearly, it is a waste of time and a tedious affair. Since we focus on reduction on the effort of the shopping procedure, we propose a system which includes the products to be scanned by a bar-code scanner and put into the cart. Once the items are added as the customer moves on , the cart will follow the customer at a specific safe distance. The cart will include a screen to generate and display the bill on the items placed into the cart. The cart will also include a payment gateway hence reducing the time of payment and the queues for the same . The system will also include checkout points for the cash payments. The cart will travel at a specific safe speed . The cart will interact with an ERP system using WIFI and will keep track of the products being purchased.***

Keywords: ***E-commerce, shopping, bar-code scanner, customer following, payment gateway, ERP, WIFI***

I. INTRODUCTION

The Internet of things (IoT) describes the network of physical objects “things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet. Things have evolved due to the convergence of multiple technologies, real time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. IoT can also be used in healthcare systems. There are a number of serious concerns about dangers in the growth of IoT, especially in the areas of privacy and security, and consequently industry and governmental moves to address these concerns have begun including the development of international standards. The project “Automated Customer following Shopping cart and billing system”, solely focuses on the automation and a hassle free shopping experience. The project includes a system which helps monitor each and every customers shopping details and assures a very time efficient checkout. The aim of this project is to implement an Automatic Billing and Human Following Shopping Cart.The concept addresses the expectations of customers whose basic demand is to reduce the various problems in the way of making their purchase. By initiating the idea of an automated shopping cart, people would easily understand the bill of products themselves, irrespective of the presence of the shop staff as details of product would be readily available and would be displayed as they scan and add the product in the cart. This outcome of this project will not only be in favor of the customers but also the mall owners who can make a one-time investment which can lead to long-term benefits in terms of business as well as customer satisfaction.

II. LITERATURE SURVEY

1) People have consistently imagined and built up an innovation to help their needs as far back as the start of humanity. The fundamental reason for headway in innovation has been in limiting errands and making regular tasks simpler and quicker, regardless of the different spaces accessible. The implementation of IOT (Internet of Things)[14 15] based automated trolley system was reported in paper[1]. 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 fall 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 subtleties 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, flowchart is shown in Fig 3.

2) Paper[2] 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.

3) Paper[3] 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. They also include a factor for measuring effectiveness of function called as RSSI (Return Signal Strength Indicator). The RSSI measurement plays a significant role in this smart trolley application as RSSI measurement indicates the directional gains that are needed for the antenna development. CSL468 RFID reader used having 16 ports and scan speed of 300 tags/sec.

4) Paper[4] proposes a cart to provide billing services using a combination of RFID and Li-Fi (Light Fidelity) systems. However, both are not used together. An option is provided at the beginning, when the trolley is put to use by the customer, to choose whether to use RFID or Li-Fi for scanning purposes. This system uses Arduino Uno Atmega328 microcontroller along with RFID module (tags and reader) and Li-Fi transmitter and receiver. If RFID option is chosen, the RFID reader is activated and on adding items into the cart, RFID tags are scanned. Otherwise, on choosing Li-Fi option, Li-Fi receiver is activated. Work flow in both cases remains the same.

5) In Paper[5] the authors have designed a construct of shopping trolley by using Arduino Uno, infrared sensors, RFID Module, LCD display, Wi-Fi modem and added a DC gear motor to enable trolley automation. It uses Ethernet Shield to connect to the Internet using Ethernet Library. The idea is to connect trolley to cell phones using Wi-Fi/Bluetooth and an Android app, in which a map of the mall is displayed. If customer wants to go to food section, select food section on map, and the trolley moves automatically to the food section. Uses RFID module (combination of tags and reader) to scan products.

6) In Paper[6] authors employed the method for the automatic billing system for supermarkets. The basic idea behind this project is that to decrease the hassle in the supermarkets so that no one has to wait in queue for hours and no one have to waste their time in billing. In the proposed system the authors have used the RFID technology for billing the items which in then integrated with ARDUINO. In this project they have not the mentioned the ARDUINO type. Also the final bill will be then send to the cashier with the help of USB and the bill can be printed on the spot. For making the making the circuit they have used DipTrace. The DipTrace is an open source software that enables us quick and easy designing of circuits. For making the admin's portal they have used Visual Basic software and with the help of Java programming language they have created the GUI for the system. So as soon as you keep something in the cart it gets scanned by the RFID reader and the bill generation starts. When the shopping gets over the customer has to press the bill button and then connect the trolley to with the computer and transfer the bill.

7) In Paper[7] 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. It offers out a serial output and contains a range of approximately 8-12 cm. There is an inbuilt antenna and is connected to the laptop with the assistance of RS232. This module is capable of handling multiple tags at a time also the range is very less so it will not get contact with other trolley. 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 model 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 however they have not mentioned how the receipt will be transferred to the billing section as they also want to keep the databases updated for refilling the stock.

8) In Paper[8] the authors designed a system for shopping mall. The system is placed in the trolleys. It consists of RFID reader and each product has RFID tag. The billing is done in smart trolley itself. Product name and its price is displayed on LCD screen. At the cash counter the total bill isrelocated to Cashier Computer by wireless Radio Frequency module. The disadvantage of this scheme is after completion of shopping, a key is pressed indicating the final promoting amount of the entire item, and we cannot add or remove the products, architecture is shown in Fig 2.

9) In Paper[9] the authors have devised a system which consists of GSM, RFID, Automatic Billing, OTP, ZigBee, PIC, etc. In this scheme, the item can be read by the RFID reader and the total of the item is showed on the LCD screen. They characterized this paper because they added some additional features in existing system; like right now, thing can be perused by the RFID peruser and the aggregate of the thing is appeared on the LCD screen. They portrayed this paper since they included some extra highlights in existing framework; like right now item weight and name appeared in plain view; in the event that thing weight is

not exactly put away weight, at that point signal will blare. There is a key cushion relegated to settle on the decisions of client. If there is unauthorized task being conducted then the user would either get a buzz sound or a message via GSM module. LED system are evenly used so as to make user alert about unauthorized activity, architecture is shown in Fig 1.

10) Paper[10] describes a shopping cart which uses the ATMega microcontroller to carry out various functionalities and the connections are made to ZigBee technology, power source, EEPROM and display unit. ZigBee network provides low cost low power connectivity for equipment that needs battery life long for several months. RFID reader is technically used to provide a unique id and mostly used to electronically record the items and information related to object using radio signals. A central automated billing system has been assigned where all data is gathered according to their personal identification device, via ZigBee communication. There the net calculations are done. Customer can get their billing details via their unique cart number.

11) In Paper[11] there is a correspondence between android gadget, principle server and charging framework entryway framework by means of ZigBee module. The absolute net measure of the items in the trolley is being determined utilizing android gadget and updates on server On adding a product in cart, the RFID Reader reads the Product ID and the information related to it is stored on a controller. There is a correspondence between android gadget, principle server and charging framework entryway framework by means of ZigBee module. The absolute net measure of the items in the trolley is being determined utilizing android gadget and updates on server.

12) In Paper[12] the authors proposed an automatic billing system by means of a smart cart which comprises of an RFID reader which will read the products containing the RFID tags when put into the smart cart, hence ensuring an auto-billing process for customers and the payment can also be done through mobile application. Radio Frequency does uses signals to identify signals and objects.it reads information form a long distance as there is no line of sight so there is no need of any physical contact. Tag than does create disturbance which is responded by decoder. A far-field antenna uses capacitive coupling to charge the RFID tag. Capacitive coupling occurs when the RFID reader's antenna propagates RF. Now here two types of RFID are available they are passive and active .Passive tags don't have an internal power source where active tags do work on battery. The electromagnetic field that surrounds an RFID antenna can be broken up into two segments – near-field and far field.

13) Paper[13] proposes a system where every item would be read by scanning tag as soon as its drop in basket. The most profound and clear system has a unique id associated to each product as soon as the product is being read by reader it automatically generates the information regarding the product on the screen. To store the product id and details and microcontroller memory is being used. As soon as the data about the product is being displayed on LCD screen the bill has been transferred to the system PC via GSM/GPRS module. As per the test, when inserting an item into the trolley or deleting an item from the cart, the cart is able to precisely and perfectly read it. One impressive experimented output is that the metal outside the cart restrict signal the signal to a high degree that when the reader is inside the cart, no other item other than the cart is being read. This clearly indicates that an item put into a smart cart will not be damaged or read by a nearby cart accidentally.

III. WORKING AND METHOLODOGY

The key target of future framework is to convey a skill worried about, ease, effectively available, and an even framework for supporting shopping. The automated shopping cart is worked to improve the total shopping understanding for store shoppers.

At first the customer goes into the mall and takes the SMART SHOPPING CART which will be equipped with an bar code scanner and a LCD display.

An object will be placed in front of the camera using which the cart will follow. As the object moves farther away from the cart, the unique object will be tracked and the cart will follow the object. Then they must shop as they do regularly additionally they should simply scan the product before putting it into the cart.

The system fetches the details and display it on the screen. Weight sensors are used to check if scanned product and product entered in the cart are same. Weight is a major constraint of the system and if it is not satisfied by entering correct product then buzzers are used to notify the seller. Similarly, for deleting the product the customer has to delete it from the invoice followed by discarding the same from the cart. In this way, whenever the customer will add or remove anything the sensor will detect this, and accordingly the invoice will be generated. Once the shopping is completed, the user can check the invoice and make payment through the billing system within the cart.

So basically the project enhances customer shopping experience. The bill is generated simultaneously, so you need not stand in a queue, waiting for people in front of you to unload their items so that the cashier could scan them and generate invoice. Also when the bill is being generated, you can keep track of your budget and by thus you can also save money and time.

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IV. FIGURES AND TABLES

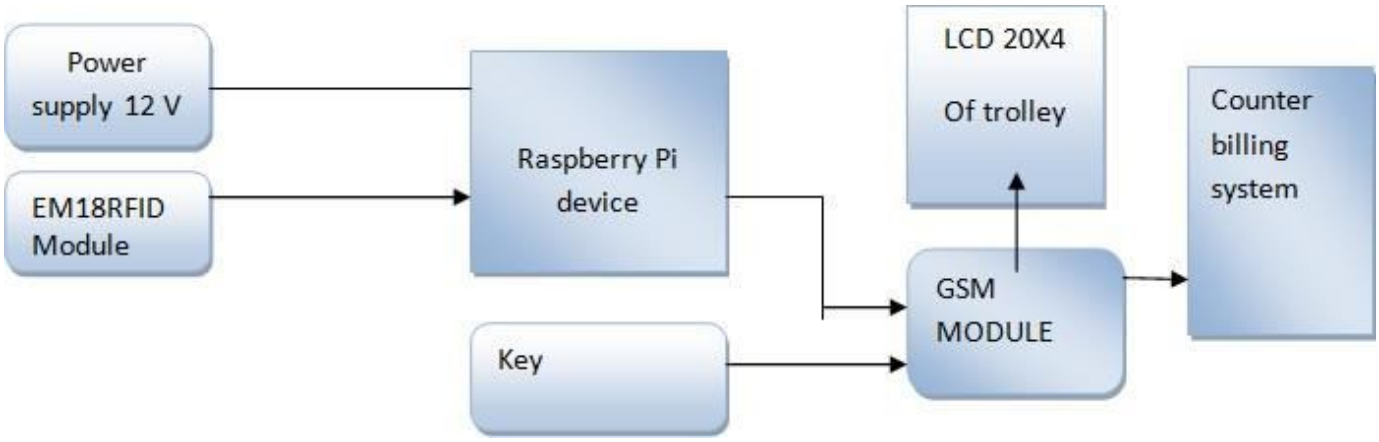

Fig1. Architecture of RFID enabled Trolley[9]

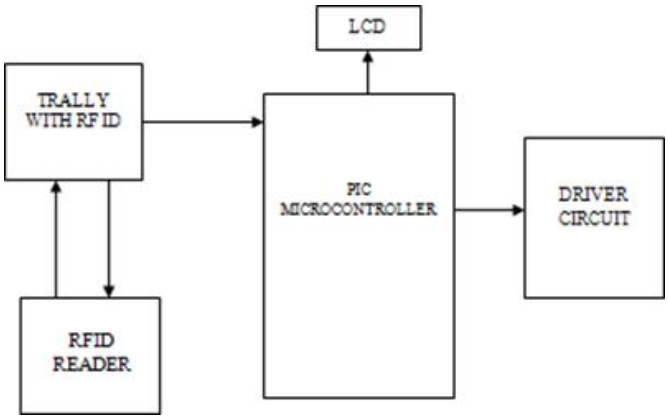

Fig.2 Architecture of RFID enabled Trolley[8]

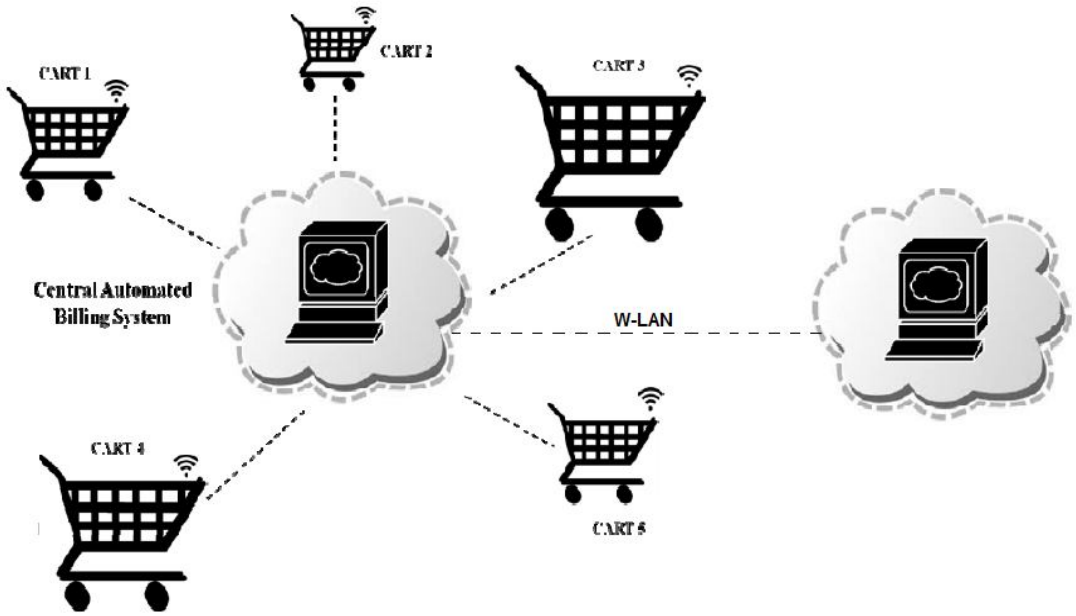

Fig 3.Central Automated Billing System product database[11]

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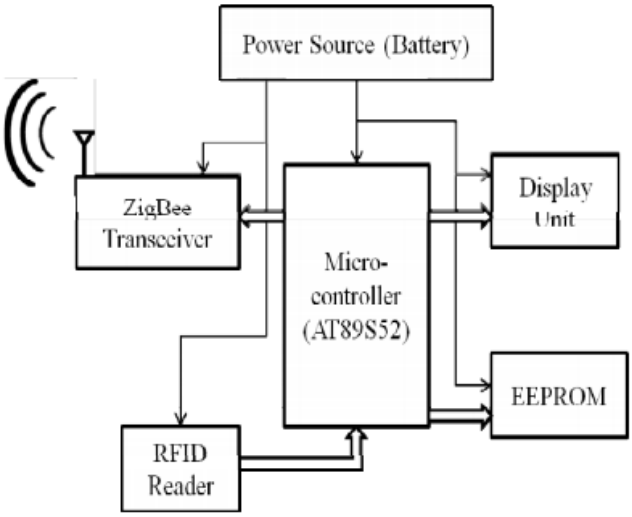


Fig 4. Hardware Implementation of Shopping Cart[10]

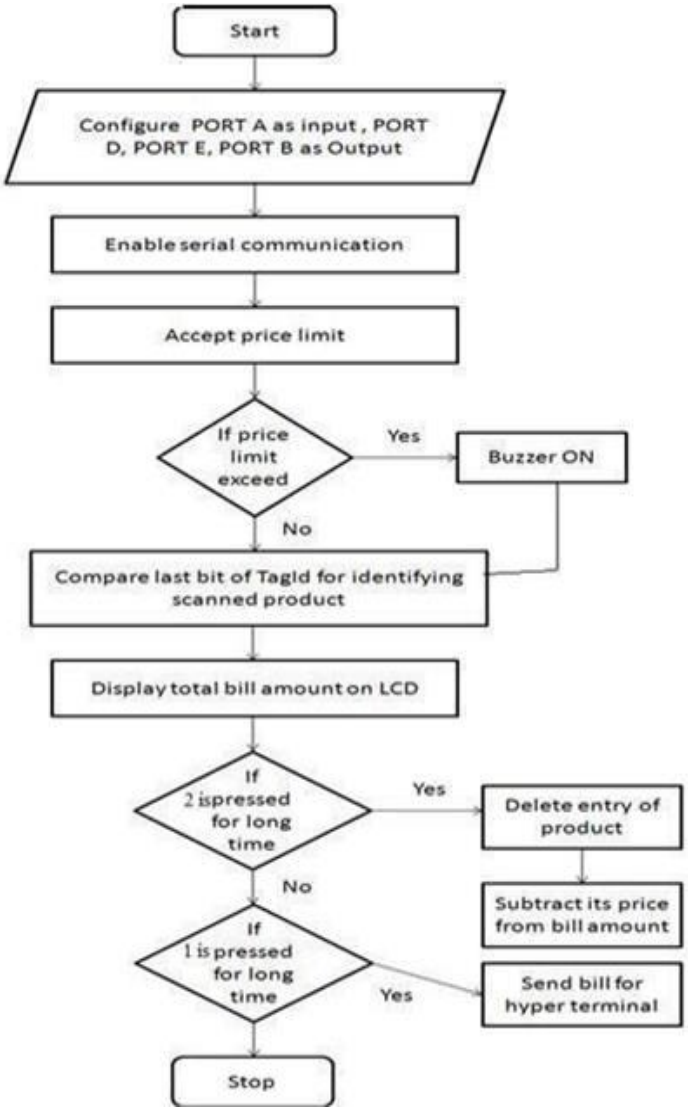


Fig .5 Flowchart of RFID enabled Trolley[1]

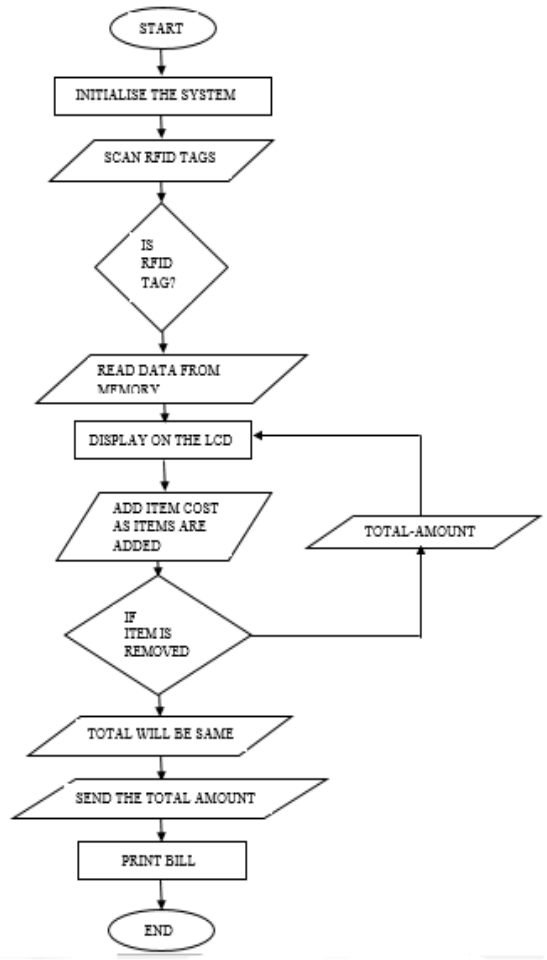


Fig 6. Flowchart of the system[2]

Hardware cost (Approximate)		Volume	AUD $
	UHF RFID reader with 2 antenna ports [21] for 650,000	1	$250
	UHF RFID tag [considering the average of 9000 - 47000 products per grocery store [22]]	1	$0.05
	Aluminum Antenna + Laser perforated plastic jigs [02 antenna per each trolley]	2	$28
	Augmented Placement carrier	1	$0.2
	Powering the reader system using an rechargeable integrated battery	1	$150
	Bluetooth adapter to communicate with kiosk	1	$6
	Localization receiver (Installed in super market and depends on the size of the super market) – Not considered in calculation	10-30	$100-200
Software Cost (Approximate)			
	Reader platform (Inbuilt)		No cost
	Configuration with existing retail platform (App + Graphical User Interface)	Per store	13,000
		Per Trolley	$30
Maintenance (10% of total cost)			
Total Cost (Approximate)			$465

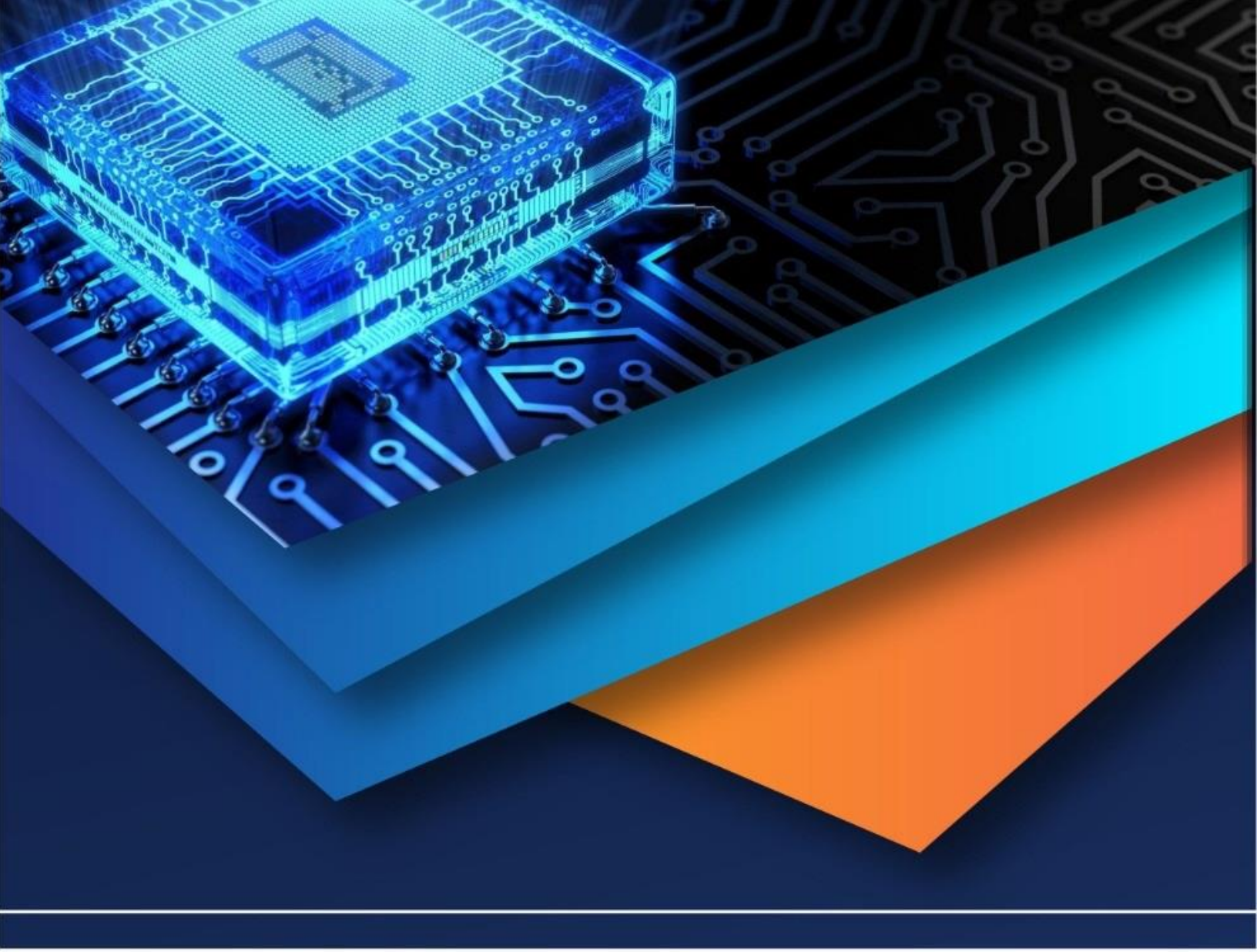
Fig 7. Cost Analysis[3]

V. CONCLUSION AND FUTURE SCOPE

While there are many papers that propose an idea for shopping carts, none of them have been able to produce an economical version of the same. There are many options that can be used to increase the productivity of this project.The project has a very vast scope in the automation of the shopping process, which also ensures effortless, minimum time consuming processes and zero wait time for shopping. The article reviewed different papers on smart shopping systems, from the above literature it can be stated that shopping can be made easier by using automated shopping cart and such systems will be able to build by using different controllers. At the same time using the above mentioned technology, it may take the system in bulky mode which can be a further an area of research. By means of this paper we intent to modify the shopping experience. The cart has the feature of calculating the entire bill mechanically and show the entire costs of all the product within it. This makes it simple for the client to understand what amount he or she has to pay during shopping and not at the checkout. One can delete the product from the cart if he/she desires. The system proposed is highly dependable, authentic and trustworthy . Also, the system is very time-efficient.

REFERENCES

[1] Priyanka S. Sahare, Anup Gade , Jayant Rohankar A Review on Automated Billing for Smart Shopping System Using IOT International Informationand engineering technology association 20 December 2018
[2] P.T. Sivagurunathan, P. Seema, M. Shalini, R. Sindhu Smart Shopping Trolley Using RFID International Journal of Pure and Applied Mathematics Volume 118 No. 20 2018, 3783-3786
[3] Tharindu Athauda, Juan Carlos Lugo Marin, Jonathan Lee, Nemai Karmakar Department of Electrical and Computer Systems Engineering Robust Low-Cost Passive UHF RFID Based Smart Shopping Trolley IEEE Journal of Radio Frequency Identification DOI 10.1109/JRFID.2018.2866087
[4] Gaikwad Prerna, Kalekar Shital, Shete Renuka, Thorat Komal, Nita R. Mhaske Smart Billing Trolley Using RFID AndLIFIInternationalJournal ofAdvancedResearch inElectrical,Electronics and Instrumentation Engineering Vol. 6, Issue 9, September 2017
[5] K.Gogila Devi,T.A.Kaarthik, N.Kalai Selvi,K.Nandhini, S. Priya Smart ShoppingTrolleyUsing RFID Based on IoT International Journal of Innovative Research in Computer and Communication Engineering Vol. 5, Issue 3, March 2017
[6] Sarika S. Pandey, Soumya R. Gupta, Meenaz M. Shaikh, Komal M. Rawat, Prof. Pravin Jangid, Prof. Ragini Mishra Smart Cart Using Arduino and RFID Volume: 05 Issue: 03 | Mar-2018
[7] Vaishali Rane, Krutik Shah, Kaushal Vyas, Sahil Shah, Nishant Upadhyay Smart Trolley Using RFID Volume: 06 Issue: 01 | Jan 2019
[8] Akshay Kumar, Abhinav Gupta, S Balamurugan, S Balaji and Marimuthu R Smart Shopping Cart School of Electrical Engineering, VIT University, Vellore
[9] Manikandan T, Mohammed Aejaz M. A, Nithin Krishna N. M, Mohan Kumar A. P, Manigandan R RFID based Advanced Shopping Trolley for Super Market Journal of Chemical and Pharmaceutical Sciences ISSN: 0974-2115
[10] Mr.P. Chandrasekar, Ms.T. Sangeetha Smart Shopping Cart With Automatic Billing System Through RFID And ZigBee CICES2014 - S. A. Engineering College, Chennai, Tamil Nadu, India
[11] Komal Ambekar, Vinayak Dhole, Supriya Sharma, Tushar Wadekar Smart Shopping Trolley Using RFID Interna- tional Journal of Advanced Research in Computer Engineering And Technology (IJARCET)
[12] S. Aishwarya, D. Gomathi Shankari, R. Ilakkiya, S. Prasanth and S. SriHeera, Smart Supermarket Trolley System Using RFID Department of Computer Science and Engineering, Easwari Engineering College, Chennai, India International Journal of Trend in Research and Development, Volume 5(2), ISSN: 2394-9333
[13] Pritha N, Sahana S, Selvin Stephy N, Shiny Rose S, Unnamalai S Smart Trolley System for Automated Billing using RFID and IoT International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 04 | Apr-2018
[14] Dhumane, A., & Prasad, R. (2015). Routing challenges in internet of things. CSI Communications
[15] Dhumane, A. V., Prasad, R. S., & Prasad, J. R. (2017). An optimal routing algorithm for internet of things enabling technologies. International Journal of Rough Sets and Data Analysis, 4(3), 1–16



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