

Automated Billing to Ease Queues at Shopping Malls through the Implementation of Effectual Gyres

U.Vinoth Kumar¹ S.Pooja² B.Vaithish Usha³ M.Vidhubala⁴ M.Yogesh⁵

¹Assistant Professor

^{1,2,3,4,5}Department of Electronics & Communication Engineering

^{1,2,3,4,5}Dr.N.G.P Institute of Technology, India

Abstract— In modern world the super markets are trying to impress the customers using attractive ideas to ease the customer’s shopping. The 3s-system is a recent advancement where the process of integrating the RFID technology takes place. In our project we propose an idea where smart shopping system can be implemented by using IoT and Raspberry pi 3b. The RFID tag which is already used in the recent technology is replaced by the barcodes that are assigned to each product. The smart cart consists of a barcode scanner that is interfaced with the Raspberry pi 3b which scans the barcode of the products that are put in the cart and displays the details regarding the product to the customer by using a mobile application. In addition the cart also contains load cells which indicates the weight of each product put in the cart. An unscanned product is recognized by an alarm using a buzzer. The main server consists of all the details regarding the products in the mall and once the shopping is done by the customer, the bill gets updated in the centralized database using IOT. This will reduce the time taken while standing in queues for billing in the checkout.

Key words: Raspberry Pi 3b, IoT, Barcode Scanner, Load Cell

I. INTRODUCTION

In today’s world, electronic commerce has developed to such an extent to provide convenience, comfort and efficiency in day to day life. To survive and thrive in competitive apparel retail industry, companies are expected to enhance customer shopping experience(CSE). The advertisements related to discounts and low price attracts the customers for shopping.

As the decision of the customers vary depending on the individual thoughts, the CSE of a retail industry has to be improved in order to maintain their position in the competitions and also favoring the customers by reducing their time in shopping. Many steps were taken to reduce the efforts such as placing an order by telephone and cash to be paid on delivery.

Now recent advancements are being done in reducing the time for shopping using automation as a key. Advancements based on Artificial Intelligence, Neural Networks, Genetic Algorithm and Fuzzy logic algorithm are at the early stage of development.

In summary, this project aims to reduce the time of a customer in supermarkets using automated billing in order to reduce queues with the help of effectual Gyres.

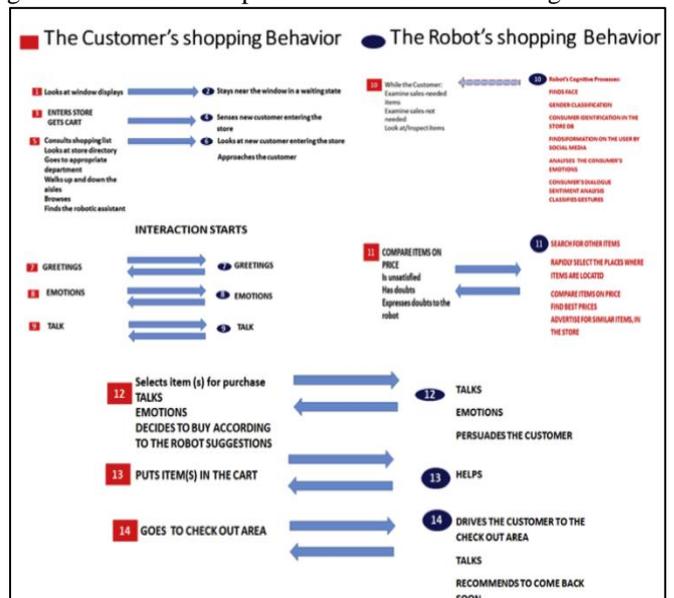
II. RELATED WORKS:

Shraddha Nitaware,et al(2017). Trolley is a common device which is used for shopping in supermarket but the billing is a tedious process. After the arrival of IOT the

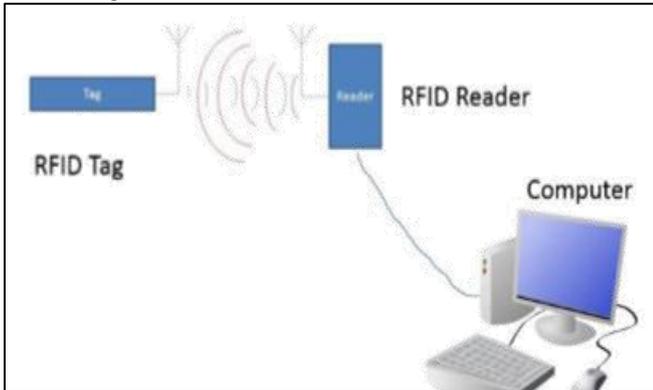
billing can be done easily. The ARM processor is used for processing and ESP (a device which uses Wi-Fi) is used for transmitting data to the central system the product data are also displayed using LCD for the customer notification. The data are sent to centralized system and billing is done by the cashier easily this reduces the time for billing. Each product contains an RFID tag on scanning the details are sent to the central system.

Sr. No.	Parameter	Existing System	Proposed System
1.	Use of Technology	Not used	Used of RFID & microcontroller for real time tracking of particulars
2.	Performance	Less efficient	Efficient for getting output in less time
3.	Time constraint	Time consuming process	Less time consuming process
4.	Cost	Less cost utilized system	Moderate cost utilized system
5.	Human error chances	More human error occurrence chances	Less human error occurrence chances

Fancesca Bertacchini, et al(2017). we present a robotic shopping assistant, designed with a cognitive architecture, grounded in machine learning system, in order to study how the human robot interaction (HRI) is changing the shopping behavior in smart technological stores. Software environment of the NANO robot, connected to the internet with cloud services, we focused our design on two main skills the has to learn: first is the ability to acquire social input communicated by relevant clues that human provides about their emotional state. Second is sthe skill to express in turn its own emotional state. The social robotics and machine leaning systems the potential of robotics to assist people in real life situation will increase, providing a gentle customers acceptance of advanced technologies.



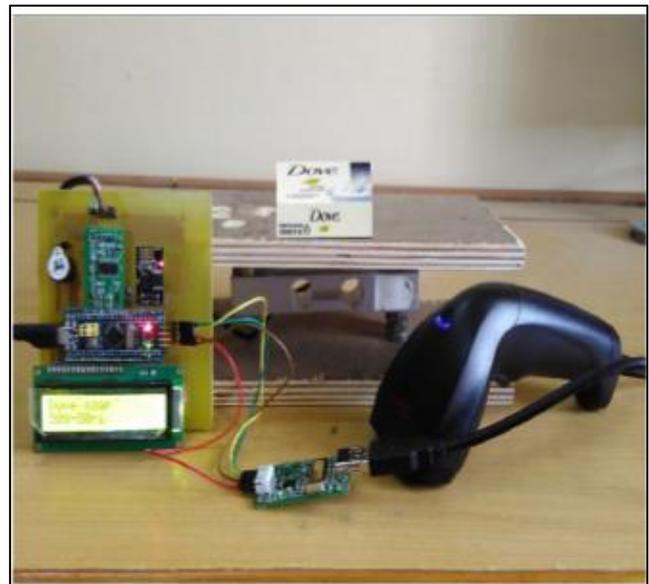
Ankush Yewatkar, et al (2016) The idea that is proposed here is the usage of the RFID and ZigBee modules are used. Each cart will be having an RFID tag which emits a radio frequency of certain range is received by a RFID reader in each cart, the centralized system is used as reference for billing. During the selection of a product the details related to the product also appear. The RFID tag is also used for the security purpose where the RFID tag which is associated with the product is scanned at the exit point for any malpractice. If the product is not scanned and billing has not been don't at the counter the at the exit point a buzzer or the alarm gives the indication.



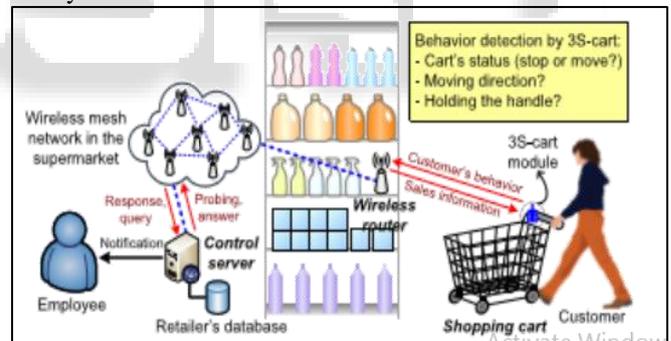
Comparison between Barcode & RFID.

	RFID	Barcode
Read Rate	High throughput. Multiple tags can be read simultaneously.	Very low throughput. Tags can only read one at a time.
Line of Sight	Not required	Required
Read/Write Capability	Ability to read, write, modify, and update.	Ability to read items and nothing else.
Durability	High. Much better protected	Low. Easily damaged, cannot be read if dirty or greasy.
Security	High. Hard to replicate. Data can be encrypted	Low. Much easier to reproduce or counterfeit.
Event Triggering	Can be used to trigger certain events	Not capable.

Bhasha Chaure, et al (2016) states that, shopping malls are being a part of our day today's life and our interests for fast and reliable shopping is growing. In this paper, every shopping cart is executed with an Item Identification Device(IID) that contains a micro-controller, LCD, standardized barcode reader, load cell and a Wi-Fi Module. The item which is picked is scanned and the information regarding the item is sent to the Base Station through Wi-Fi and this makes the billing process consume less time.



You-Chiun Wang, et al(2016) The paper proposes a sensor-based smart shopping cart (3S-cart) system by using the context-aware ability of sensors to detect the behavior of customers, and respond to them in real time. A prototype of 3S-cart is implemented by encapsulating modularized sensors in a box to be put on shopping carts. In the product-navigation application, a customer asks the system to find an unhindered, shortest path to comfortably obtain the desired product. The paper contributes in exploiting the sensor technology to provide interactive shopping in supermarkets, and addressing the prototyping experience and potential applications of the proposed 3S-cart system.



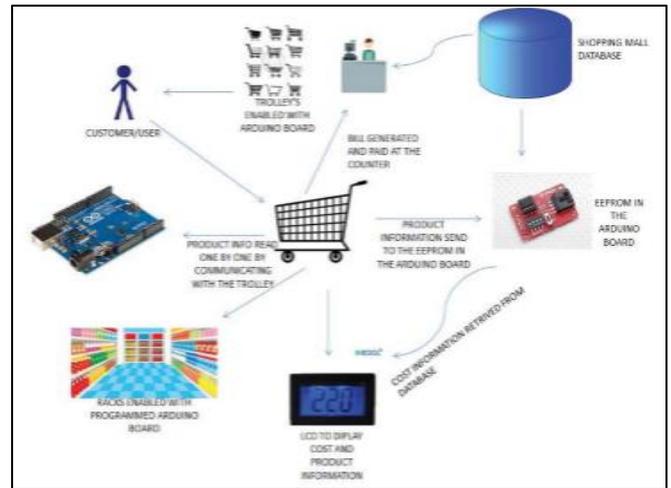
Ajay Kumar, et al (2016) suggests that our kitchens are always occupied with LPG cylinders which help us in cooking, but this can be dangerous and life threatening. Hence it requires constant vigilance to reduce the danger. In this paper we have implemented the use of weighing sensor which can measure the weight of the cylinder and regularly update the user about the gas left in the cylinder. Moreover everyone is busy in their daily life in the present time and it is difficult to know the status of the cylinder. This system will register your booking through GSM technology by sending SMS to the distributed company and also sends an alert message to the user. It is very helpful for people living alone in their old age.



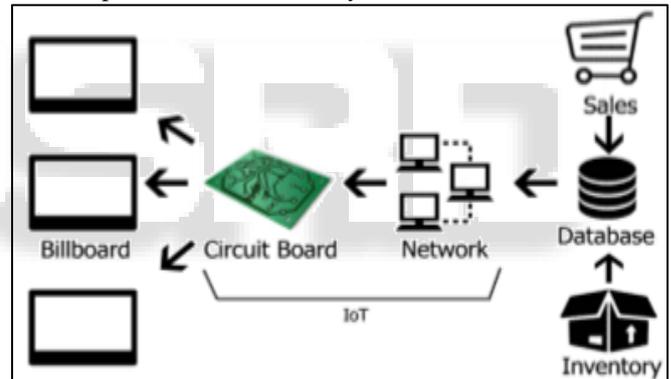
Anu Priya.S.L, et al(2016) The main purpose of this paper is to reduce the shopping time the develop system consists of ARM7 microcontroller, 16*2 LCD display unit, RFID reader, RFID tags, ZIGBEE transceiver and a battery power source. All the items are equipped with RFID tags and once an item is picked, the code will be detected and send to the billing counter. LCD display helps the user to find the details of the items which are picked. Once the shopping is done all the details of the product are generated in the shopping card and at the same time all the information regarding the product are sent to the database server through the wireless ZIGBEE transmitter. At the billing counter the total bill is transfer to the PC by a wireless ZIGBEE receiver.



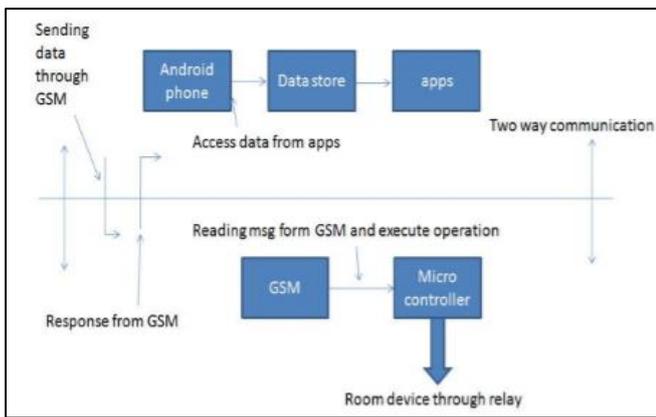
P. Iyappan, et al (2016) Ubiquitous computing is one of the growing technologies which is exploring different ways to let smart devices to function without the user's effort. When it comes to shopping, we implement the use of RFID technology in order to make our shopping in a smarter way but however RFID Technology is not that efficient when it comes to cost. To overcome this, we implement the use of Smart Arduino Based Intelligent Shopping Architecture where the trolley is enabled with a device consisting of an Arduino Board programmed with the details of the product and it involves wired mechanism. This makes the best use of cost effectiveness.



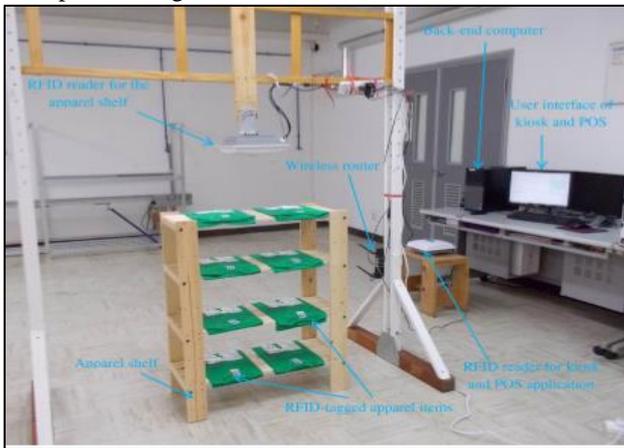
Saral Nigam et al(2016)the recent advancements in the embedded technology led to the development of the Raspberry pi which acts like a CPU. In this paper the Raspberry pi B+ v1.2 development board is used along with RFID. Each product is associated with a its details such as price, discount rates. A common display board is kept at specific locations for the user's convenience. If the user wants to buy a product all the guidance are provided to pick the product form the stack, this helps the user reducing the time of shopping. The raspberry pi is used to transfer the selected product to the central system.



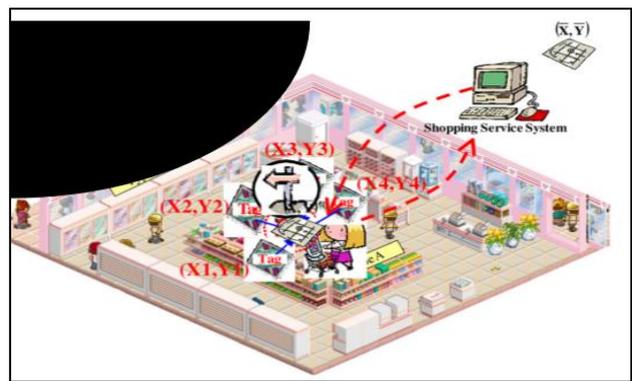
S.Anusha,et al(2015)Home automation is the process where the appliances in home are controlled using IOT. This process of controlling is done using the application that is specifically designed for the android mobile and the embedded circuit is interfaced with the mobile. The ATmega328 is a micro controller which is used to give the AT command which helps the user to identify active appliances. The mobile commands are received by the circuit and are decoded and are used for processing. Using the on/off commands in mobile the appliances can be switched on/off.



S.H.Choi, et al (2015) The customers experience on shopping is also a best way to increase the sales, for this process an application has been developed using Intelligent Fuzzy Screening algorithm where the total details of the goods in the super market and the availability of the product are displayed . The products details including the discounts, location of the product in the supermarket are displayed .It reduces the searching time of product for the customers. If the customer selects the product then the complete guidance of the product is given to the customer.



Jiang-Liang Hou, et al(2010) Modern market have put intensive effort on commodity arrangement in order to satisfy the consume demands on commodity purchase, most of the markets do not provide the satisfactory shopping services to consumers and spend lot of time for commodity selection. Therefore, regarding the shopping services of a modern market, this research develops a customized commodity recommendation algorithm and a shopping route determination and guiding algorithm. A shopping service system(3s-system) is established by integrating the RFID technology. The consumer demands, consumer shopping preferences and market promotion plans, this system proposes an integrated, heuristic methodology to provide a customized purchase list. A shopping service system (3s-system) is established and a stimulated market is created in order to verify the feasibility of the proposed model. This system can offer customers appropriate shopping route recommendation in a short time and achieve a real time guiding. As a result the shopping service quality of modern markets can be enhanced and the sales volume of commodities can be increased.



III. CONCLUSION

We have a drawback of using wired mechanisms and we also face an issue where the trolleys are being pulled by customers physically. To overcome this we have implemented the usage of RFID tag which is given to the customer which helps the cart to follow the customer automatically and more over the RFID tag which is programmed in such a way that it is contended only to a single item at a time is replaced by a barcode reader that is attached to the cart which helps the customer to scan all the products that are being purchased.

REFERENCES

- [1] Sharddha Nitnaware, Geeta Pawar, Kanchan Govade. “ Smart Trolley Using IOT”, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Vol 5, (2017).
- [2] Francesea Bertacchini, Eleonora Blotta, Pietro Pantano. “Shopping With A Robotic Companion” ELSEVIER, Vol 1 14, (2017).
- [3] Ankush Yewatkar, Faiz Inamdar, Raj Singh, Ayushy Amol Bandal. “Smart Cart with Automatic Billing, Product Information Product Recommendation Using RFID and ZIGBEE with Anti-Theft”, 7th International Conference on Communication, Computing and Virtualization, Vol 793- 800, (2016)
- [4] Bhasha Chaure, Preet Jain.“Development Of E-Shopping Cart With Theft Control Mechanism: No Queue”, International Conference on Emerging Technological Trends[ICETT], (2016).
- [5] You-Chiun Wang, Chang-Chen Yang “3S-Cart: A Lightweight, Interactive Sensor-Based Cart Fssor Smart Shopping In Supermarkets”, IEEE SENSORS JOURNAL, Vol 1-8, (2016).
- [6] Ajay Kumar, Mukesh Kumar, Balwinder Singh “Designing And Implementation Of Smart LPG Trolley with Home Safety”, 2nd International Conference on Next Generation Computing Technologies (NGCT), Vol 185-190, (2016)
- [7] Anupriya.S.L, B.Jyothi, Nithiyagopal.P.G, Shilpashree.L, Prof. S.Sowndeswari “Wireless Smart Trolley for Shopping Malls Using ZIGBEE”, International Journal of Application or Innovation in Engineering & Management (IJAEM), Vol 6, (2016).
- [8] P.Iyappan, S.Suiya Jana, S.Anitha, T.Sasirega, V.Prasanna Venkatesan “An Enhanced Shopping Model for Improving Smartness in Markets Using SABIS

- Architecture”, IEEE WiSPNET conference, Vol 140-145, (2016).
- [9] Saral Nigam, Shikha Asthana, Punit Gupta “IOT Based Intelligent Billboard Using Data Mining”, 1st International Conference on Innovation and Challenges in Cyber Security (ICICCS), Vol 107-110, (2016).
- [10] S.Anusha, M.Madhavi, R.Hemalatha “Home Automation Using Atmega328 Microcontroller And Android Application”, International Research Journal of Engineering and Technology (IRJET), Vol 2, (2015).
- [11] S.H.Choi, Y.H.Yang., B.Yang,H.H.Cheung “Item-Level RFID For Enhancement Of Customer Shopping Experience in Apparel Retail”, ELSEVIER, Vol 10-23, 2015.
- [12] Jiag-Liang Hou, Ting-Gin Chen “An RFID-Based Shopping Service System for Retailers”, ELSEVIER, Vol 103-115, (2011).

