

Smart Shopping Cart using RFID and NodeMCU

**Prof. Kanchan M. Pimple, Prof. Shraddha Sunilrao Kukade, Prof. Shivani Gajanan Dharmale,
Shyam M. Rathod, Akash D. Shinde**

Department of Electronics & Telecommunication Engineering
Dr. Rajendra Gode Institute of Technology and Research Amravati, Maharashtra, India

Abstract: *Now a days shopping at the mall have become a day's routine in big cities. People buy a different product and deposit them in the trolley. After completing the shopping one need to go billing counter for pay the bill which is very time consuming and at times very disappointing. So the objective for designing this model is to reduce the human efforts and also reduce the time taken during the billing. In this system, we designed reasonable and cost-effective Smart Shopping Cart utilizing IoT innovations. Our model having a components such as RFID tags, RFID reader, LCD screen.*

Keywords: RFID

I. INTRODUCTION

Now a days world has fast-growing population with a wide range of the demand from a variety of domains. shopper who need to buy different products in supermarkets needs lots of time and restraint in coordinating among them self for successful shopping. We have a solution to this problem by using technologies. In advancement technologies, world is getting automated in a lot of aspects. In this system, we designed reasonable and cost-effective Smart Shopping Cart utilizing IoT innovations. Such a framework is useful in spots such as mall & supermarkets, where it can help in lessening work and in making the best shopping knowledge for the clients. This structure helps in maintaining the easy and comfortable billing process. The shopping processed with two aspects, with predefined list and random shopping. Our proposed system provides the nearest route to shop-up the listed items present in different racks of supermarket. Also, with added feature we have an approach where Cart-to-Cart communication is enabled that allows a shopper to share their shopping list with co-shopper to enable parallel shopping using two or multi cart. That features save time and make shopping easily. With this technology, this system design is also capable of detecting theft by shoplifters. In addition, the Walmart or supermarket management will be able to analyse the shopping behaviour of various customers to arrive at valuable business insights. This system is very helpful and convenient for all retailers. The management system will have the power to detect the rate of sales of all individual products and make the stock available is based on the ongoing shopper requirement.

II. LITERATURE SURVEY

The Number of methods is proposed by researchers in this domain. B. Ananthabarathi proposed High Speed Billing System in which RF detector is placed inside the shopping cart which is linked to the server for billing.

R.Rajeshkumar, R.Mohanraj, M.Varatharaj proposed Smart Trolley in which they have used RFID cards for each product and RFID reader with MCU on each trolley for calculating the bills while shopping .

P. Chandrasekar, T. Sangeetha have proposed Smart Shopping Cart with Zigbee and RFID in which they utilize RFID cards for each product along with Product Identification Device (PID) for the trolley which is used for calculation of products and bill. This approach used Zigbee for transmitting the billing details to central billing system [1]. Few more researchers have proposed system for billing management but most of the methods are similar in nature and used MCU plus communication module-based system for each trolley [5], [6], [7]. There are several technologies available for Instinctive Recognition systems.

Mayur Chaudhari, Amit Gore, Rajendra Kale and S.H. Patil, "Intelligent Shopping Cart with Goods Management Using Sensors", International Research Journal of Engineering and Technology (IRJET), Volume 3 Issue 05 May 2016.

S. Rohith and C Madhusudan, "Easy Billing System at Shopping Mall Using Hitech Trolley", International Journal & Magazine of Engineering, Technology, Management and Research, Volume 2, Issue 7, July 2015

There are several technologies available for Instinctive Recognition systems.

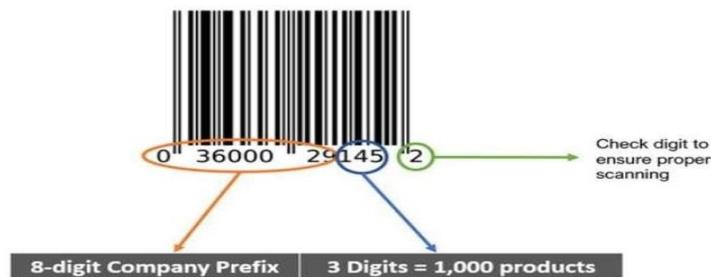
III. BARCODE SYSTEM

- **Scanner:** The scanning head shoots a laser that scans over the black and white areas of the barcode. The light is reflected back to a photoelectric reader.
- **Barcode:** Black areas of the code reflect less light back, white reflect more. The reader converts the different light levels into 1s and 0s.
- **Binary Code:** The binary code is sent to a computer, which decodes it based on the scheme that was used to create it.

3.1 What is Barcode Reader

A barcode reader is an electronic device for reading printed barcode. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulse into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.

- **Barcode Scanner:** A barcode reader is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Barcodes originally were scanned by special optical scanners called barcode readers; later, scanners and interpretive software became available on devices including desktop printers and smartphones. The first use of barcodes was to label railroad cars. But they were not commercially successful until they were used to automate supermarket checkout systems, a task for which they have become almost universal.



IV. INTERNET OF THINGS (IoT)

The internet of things could also be a system of inter related computing devices, mechanical and digital machines, animals or folks that are given Unique Identifiers (UIDs) and, therefore, the capacity to transfer data over a network without the requirement of human-to-human or human-to-computer interaction. Increasingly, organizations in a variety of industries are using IoT to work more efficiently and effectively, and to better understand customers to deliver enhanced customer service, improve decision-making and increase the worth of the business.

The system do most of work without human intervention, although people can interact with the devices – for instance, to set them up, give them instructions or access the data.

The IoT helps people for live and work smarter. In addition to offering smart devices to automate homes, IoT is useful to business. IoT provide the businesses with a real-time look into how their systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations. IoT authorize companies to automate processes and reduce labor costs. It also cuts down on waste and improves service delivery, making it less expensive to produced and deliver goods, as well as offering transparency into customer transactions.

V. WORKING

We all have waited in a queue for payment in shopping malls and other places, it's very tiring and wastes a lot of time in the billing process. Now days will build a smart shopping cart with an automatic billing device that not only reduces the waiting time but also makes the process very smooth and easy.

We use RFID cards and RFID readers with NodeMCU to build the Smart Shopping Cart system. The cart information and total value will be displayed on the screen as well as on LCD. Each RFID card is related with a certain product and an

RFID reader is installed in the cart. This cart read product details like Price and some information sends them to NodeMCU ESP8266. Then NodeMCU process the available product and total value in the cart and send it to ESP8266 Webserver, which can be monitored on a web browser from anywhere in the world. Web servers are used to control or scan any sensor value using web browsers.

Different variables such as object prices, object name etc. are every time displayed on LCD attached to the trolley. Thus, we can say that automatic billing of products using RFID technology will be a more viable option in the future and thereby make the operation more concise and systematic.

The developed product is low cost and easy to use and does not require any special practice. The capacity to take the decision can be done in the cart automatically which can be used in the shopping complexes for effortless and clever way of purchasing items to save the shopper vitality, time and money.

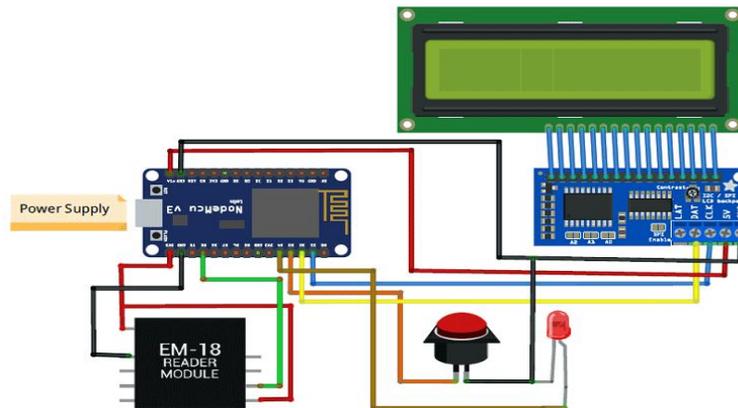


Figure 1: Circuit diagram for RFID based Intelligent Shopping Cart System

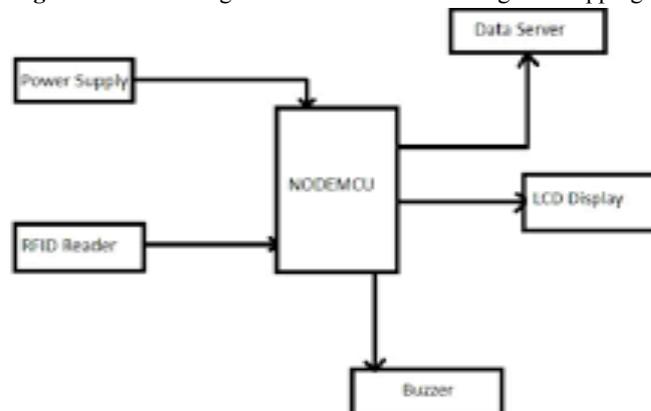


Figure 2: Block diagram for RFID based Intelligent Shopping Cart System

5.1 Advantages

1. This system helps in achieving a faster billing system.
2. The innovation payment method avoids the long waiting time.
3. Helps the buyer to know the bill details in advance so that he can plan an affordable purchase.
4. Intimate the customers about the current offers by showing pop-up in the trolley screen.
5. Helps in business promotions for the supermarkets by gaining more customers providing quick service.
6. Easy to use and does not need any special training.
7. RFID tag and reader should not be in LOS to make the system work.
8. Unlike barcodes, tags can store more information.
9. Moreover, it follows commands or instructions of reader.

5.2 Disadvantages

1. Fraud and security concerns. Given the lack of ability to inspect merchandise before purchase, consumers are at higher risk of fraud on the part of the merchant than in a physical store.
2. Privacy.
3. Hands-on inspection.
4. Ensuring that the retailer has an acceptable privacy policy posted. For example, note if the retailer does not explicitly state that it will not share private information with others without consent.

VI. CONCLUSION

In this project RFID used as security access for the object which there by increases the observation performance. this implementation begins with an automated central billing system in shopping malls and supermarkets. With this, customer no longer have to wait near counter for payment of bills because of their purchased product information getting transferred to central billing unit. This speed up the billing process and makes it much easier. In addition to this ability, the mechanism also assures identification of cases of the inspired by cheater customer which makes the system more reliable and attractive to both shopper as well as seller. This will take the shopping experience to a whole new level.

VII. FUTURE SCOPE

This project can be extended by using robotic arm for the picking and dropping of the product. And also we can use GSM module so that bill will be transferred to mobile. We can attach a swapping machine to trolley so that there is no need to visit at billing counter. The proposed Smart Shopping Trolley System assist shopping in-person which will minimize the considerable amount of time spent in shopping as well as to time required in locating the desired product with ease. The customer just needs to type the name of the product he wants to search on the Android device, and the cart will automatically guide him/her to the product/s locations. With the help of optical sensor, motors, and motor drivers, we will make trolley in such a way that it will follow the customer which purchasing items and it maintains the safe distance between customer and itself.

REFERENCES

- [1]. Mayur Chaudhari, Amit Gore, Rajendra Kale and S.H. Patil, "Intelligent Shopping Cart with Goods Management Using Sensors", International Research Journal of Engineering and Technology (IRJET), Volume 3 Issue 05 May 2016.
- [2]. Suraj.S, Vishal Guruprasad, Udayagiri R Pranava, Preetham S Nag, "RFID Based Wireless Intelligent Cart Using ARM7," *International Journal of Innovative Research in Science, Engineering and Technology*, Vol. 5, Issue 8, 2016.
- [3]. B. Ananthabarathi, "High Speed Billing System in Departmental Stores" Middle-East Journal of Scientific Research, pp. 1828-1832, 2012.
- [4]. R. Rajeshkumar, R. Mohanraj and M. Varatharaj, "Automatic Barcode Based Bill Calculation by Using Smart Trolley", International Journal of Engineering Science and Computing, Volume 6, Issue 3, 2016.
- [5]. Janhavi Iyer, Harshad Dhabu and Sudeep K. Mohanty, "Smart Trolley System for Automated Billing using RFID and ZIGBEE", International Journal of Emerging Technology and Advanced Engineering, Volume 5, Issue 10, October 2015.
- [6]. P. Chandrasekar and T. Sangeetha, "Smart Shopping Cart with Automatic Billing System through RFID and ZigBee", In proceedings of IEEE International Conference on Information, Communication and Embedded System (ICICES) pp. 1-4, 2014.
- [7]. S. Rohith and C Madhusudan, "Easy Billing System at Shopping Mall Using Hitech Trolley", International Journal & Magazine of Engineering, Technology, Management and Research, Volume 2, Issue 7, July 201
- [8]. Tharindu Athauda, Juan Carlos Lugo Marin, Jonathan Lee, Nemaï Karmakar, "Robust low-cost passive UHF RFID based smart shopping trolley" in IEEE Journal of Radio Frequency Identification, Issue in 2018.
- [9]. Rajlakshmi Badi, Bashirahamad Momin, "SISC: Sensor-based Intelligent Shopping Cart" in 3rd International Conference for Convergence in Technology