Internet of Things Based Smart Shopping Cart using RFID Tag

Saurabh Shrivastav[1], Prajakta Gwalherkar[2], Tejal Jadhav[3], Pooja Naidu[4], Prof. D.D. Survase[5]

[1,2,3,4] Student, Department of Computer Engineering, JIT's Institute of Technology, Management and Research, Nashik, INDIA

[5] Professor, Department of Computer Engineering, JIT's Institute of Technology, Management and Research, Nashik, INDIA

Abstract— Time is most valuable in everyone's life, no one wants to waste their time. But while shopping everyone wastes most of the time at the billing counters by standing in a queue. If it is a festival season, the crowd is usually high and billing time will increase promotionally. Therefore, the main aim of the smart shopping cart is to reduce the shopping time Also in the pandemic we are facing today, malls are allowing only 15 max people at a time to avoid crowd, and make the shopping experience more easily and safely, at present, the world's population is growing rapidly, leading to a wide variety of needs in different lands. With the development of human society, supermarkets have become part of our daily lives, where consumers can feed themselves using carts or baskets while searching for the products they need. The goods are packed in baskets or carts and taken to an exit. While customers enjoy the convenience of getting the most out of everything, they need due to the availability of a wide variety of goods, finding items in a supermarket can be time-consuming and can lead to physical fatigue and frustration. As we notice, money and average time spent on each customer makes it less. The main aim is to satisfy the customer and reduce the time spent on the billing process which is very hectic and time-consuming. This paper focuses on reducing the queue at a billing counter in a shopping complex. In this way the customer can directly pay the amount at the billing counter and leave with the belongings he/she has bought. It eliminates the old method of scanning of products at the counter and in turn speeds up the entire process of shopping, it reduces the possibility of human error due to all automated processes. Also, the system has a feature to delete the scanned products to further optimize the shopping experience of the customer. The hardware for the test run is based on the Cloud platform and the RFID reads and RFID tags, as both are very popular in small-scale research and wireless automation solutions.

Keywords: Smart cart, RIFD, WiFi, Microcontrollers.

I. INTRODUCTION

A huge crowd in the supermarket at the time of discount offers or weekends makes trouble to wait in long queues because of a 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, NodeMCU microcontroller, Mobile application. RFID sensors depend on wireless communication. One part is the RFID tag attached to each product and the other is RFID reader that reads the product information efficiently. After this, each product information shows in 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.

In shopping malls or complexes, the customers themselves can make billing, so it is easy for the customer to estimate the bill also. The shopping malls can reduce the manpower at billing counters and space occupation which in turn reduces efforts & investment. Either it can be used to improve the quality and consumer experience. More products can be placed instead of billing counters to attract customers. Among the difficulties faced by the customers, one difficulty is to follow the queue through the billing process. Though their intent is just to buy one or two products, waiting to bill products consumes time & also inconvenient these days.

To achieve this all products in the mall should be equipped with RFID tags and all trolleys should be equipped with a RFID reader and LCD screen .When one puts any product in the trolley its code will be detected automatically , the item name and cost will be displayed on the LCD, thereby the cost gets added to the total bill. If we wish to remove the product from the trolley, you can take away the product and the amount of that specific product gets

deducted from total amount and the same information passes to the central billing unit via ZigBee module . Hence the billing can be done in the trolley itself thereby saving a lot of time to the customers.

II. LITERATURE REVIEW

- Nowadays, thanks to the Internet of Things (IoT), machines and devices can communicate through a network of wireless networks. It is now possible to be given computer power and the ability to communicate with common objects, allowing for the connection of objects together everywhere. As a result, changes in financial, environmental, and industrial systems are taking place at present, creating significant challenges in data management, real-time decision-making, and wireless communication. In addition, several issues have arisen including security and privacy that have arisen and easy-to-use forms that can be used with IoT systems are in high demand. As a result, several research studies are being conducted on various IoT applications, such as smart homes, IoT health systems, wearable devices, and many more.

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- The customers must add the products via scanning the product. Customers could either pay their bills by their ATM cards or through pre-recharged customer cards provided by the shop. We have ensured security for payment options. Our goal is to decrease the time consumption in the purchase by getting rid of the queue, Therefore, this paper focuses on a smart shopping basket based on IoT technology, which is an area that has not been studied extensively in previous research. In the application of this program, consumers will scan each item with a barcode scanner in the mobile app, and product information will be displayed, and the required amount will be updated automatically and quickly.
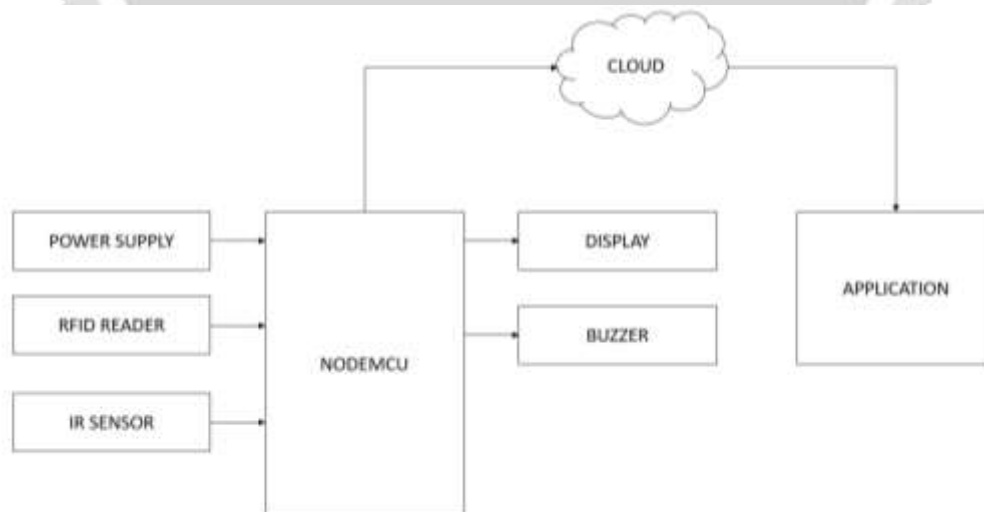
III. PROPOSED ARCHITECTURE

Figure 1 System Architecture

A huge crowd in the supermarket at the time of discount offers or weekends makes trouble to wait in long queues because of a 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, NodeMcu microcontroller, Mobile application. RFID sensors depend on wireless communication. One part is the RFID tag attached to each product and the other is RFID reader that reads the product information efficiently. After this, each product information shows in 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.

The RFID cards and RFID readers with NodeMCU is used to build the Smart Shopping Cart project. The cart information and total value will be displayed on the application as well as on LCD. Each RFID card is associated with a certain product and an RFID reader is installed in the cart, which reads the product details like Price and Product details and sends them to NodeMCU ESP8266/ESP32. Then NodeMCU process the available items and total value in the cart and send them to cloud, which can be monitored on an application from anywhere in the world. Main dashboards are used to control or monitor multiple shopping cart by the employees of shopping mall

IV. RESULT

Figure 2 – Smart Cart hardware Setup

Figure 3 – User Interface

V. CONCLUSION

After taking into consideration the solutions proposed by different researchers, the proposed model concludes of a design with RFID tags and reader against existing printed barcode and barcode scanner for reducing long queues at the billing counter and making purchase experience of customers satisfactory. Moreover, trolley equipped with RFID reader displays the total amount of products added in the cart. In this case, we have suggested a smart checklist with the Controller included in the shopping cart for shopping activities, such as adding or removing items to the cart. The program is based on a laptop and in-depth cloud learning services. The use of this type of smart shopping system will provide a very beneficial way for customers to avoid the distractions they often experience while shopping, especially during the holidays. By simply using the app on their smartphone or device, customers will be able to handle all of their purchasing needs within the sales environment using the program described in this study. Because items are scanned as soon as they are placed in a shopping cart or cart and the bill is digitized and transferred to a registered consumer email address, time can be saved without waiting in the long queue for Money. Therefore, the strong potential of the IoT system that can be used in supermarkets and shopping malls is evident.

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