Smart Retail: Integrating IoT for Enhanced Shopping

V. S. Nishok, Raja S, Aadhi Piranav R T, Dinesh Kumar S, Enbaraj R and Hariharan R M

Department of Electronics and Communication Engineering, SNS College of Technology, Coimbatore, Tamil Nadu, India

Keywords: RFID, IoT, Shopping, Error Detection, Financial Accuracy, Internet of Things.

Abstract: In this work, a smart shopping cart's hardware and software implementation is developed with an emphasis on affordability, modularity, and usability. Once this solution has been adjusted, traders can immediately begin using it. It usually tries to satisfy as many end-user requirements as it can. The growing growth of the Internet of Things has mostly resulted in the automation and optimization of repetitive activities. As a result, people have more time for their hobbies and careers. Shopping is one of the most time-consuming activities people perform, particularly in congested areas. Even though e-commerce is undoubtedly growing in popularity, consumers typically feel compelled to scrutinize the products they purchase and consider any in-store discounts. In these situations, people are compelled to wait in queues, which can occasionally grow rather long. Standing in line can lead to a number of stressors and discomforts. Every transaction has an affordable RFID tag that can be promptly read by a smart shopping cart equipped with an RFID reader. Another potential addition to this system is smart shelving, which uses RFID scanners and can track inventory while possibly updating a central server. Because RFID technology can automatically read every item and determine whether a product's expiration date has gone, it also makes inventory management easier. The IOT website will be updated with all of the new material.

1 INTRODUCTION

An automatic billing system is a high-end solution that automates the creation, sending, and management of invoices according to the billing flows of businesses. It provides a convenient way of making payments without allowing humans to enter calculations and documentation. It is cheaper, quicker, and more efficient. ABS is crucial to a number of industries such as e-commerce, energy, telecom and subscription services. Main Features of an Automated Billing System. The system automates essential tasks such as notifying customers of impending or overdue payments, collecting money via linked payment gateways, and creating invoices based on usage or subscription plans. It also tracks payment history, generates comprehensive reports and maintains patient data to provide insights for financial decisions and planning. ABS minimizes human error and wastes and saves time as well as administrative costs. It improves the customer experience through features such as real-time updates, online payments and easily accessible billing information. Moreover, it can easily scale to accommodate a larger number of transactions as the

business expands. The long-term benefits outweigh the challenges, ensuring improved cash flow and operational efficiency even though the initial setup and integration may be expensive. In the present digital era, it is an essential tool for businesses trying to optimize their billing processes and deliver faultless customer service.

2 EXISTING METHOD

The product's quantity is verified using a barcode scanner. Data is transferred to the PC via ZigBee. To verify the load on another cart, it lacks a load sensor. Because the system uses tally for billing and ZigBee for communication, it operates quite slowly. Every day, thousands of people go to a supermarket or mall to buy a variety of goods. Nowadays, in order to buy a variety of goods at supermarkets or shopping centers, a trolley is necessary. The process of purchasing a product might be difficult. The consumer has to pull the cart each time to retrieve the items and put them inside. He is also in charge of managing the cost computation. Customers have to wait in a long line to pay their bills and scan their

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purchases after completing a transaction. To avoid this, we're coming up with a smart shopping strategy. Each and every item has an RFID tag attached to it. The smart trolley will include an RFID reader and transmitter. When the customer scans and adds any item to the cart, the product name and price will show up. The total cost of all the products will be included in the final bill, which will be stored in the micro controller's memory. The product details of the items in the cart will be wirelessly transmitted to the main computer via a transmitter. Consequently, one must always keep the budget in mind while avoiding the charging line. Figure 1 shows the flowchart of existing method.
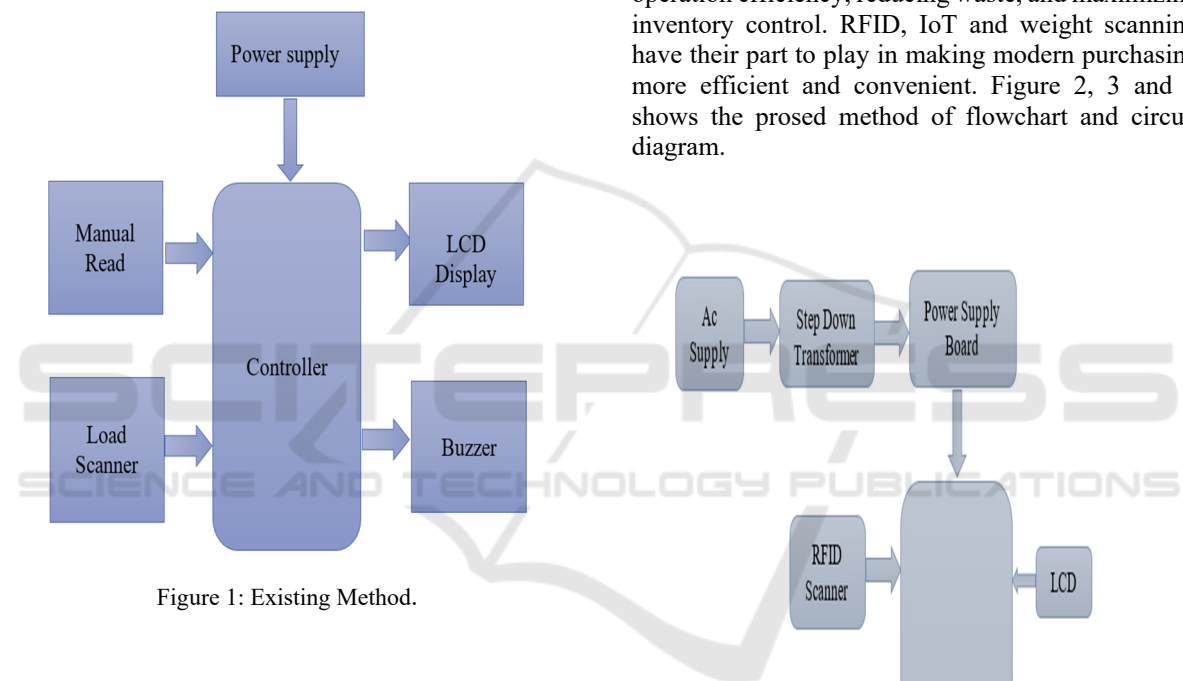

Figure 1: Existing Method.

3 PROPOSED SYSTEM

The smart shopping cart system uses RFID and weight scanning technology to enhance both the shopping experience and business operations. The RFID reader instantaneously confirms a product's name, price, and quantity when it is put to the cart. The cart can track the total number of products and their details in real time because each one has an RFID sticker that the scanner can read. A weight scanner is installed inside the cart to determine the overall weight of the items in order to make sure that the load does not exceed its capacity. This is vital for logistics and inventory control and helps store workers keep an eye on what the cart contains. NodeMCU simplifies integration with the store's backend system by sending all of the RFID and

weight scanner data to an Internet of Things website. This includes product information, the total weight of the basket, any relevant changes in product demand or stock levels, etc. An LCD fitted to the cart displays the purchases, the total weight, and other crucial details. The method is meant to alert the customer with a buzzer when a product is ready to expire. This helps you avoid buying things that should not be sold. The store has two different IoT sites that show real-time updates on the demand for products, as well as supply management and which products to keep an eye on are in high demand. This smart cart system makes the shopping experience for customers more efficient, in addition to improving overall retail operation efficiency, reducing waste, and maximizing inventory control. RFID, IoT and weight scanning have their part to play in making modern purchasing more efficient and convenient. Figure 2, 3 and 4 shows the prosed method of flowchart and circuit diagram.
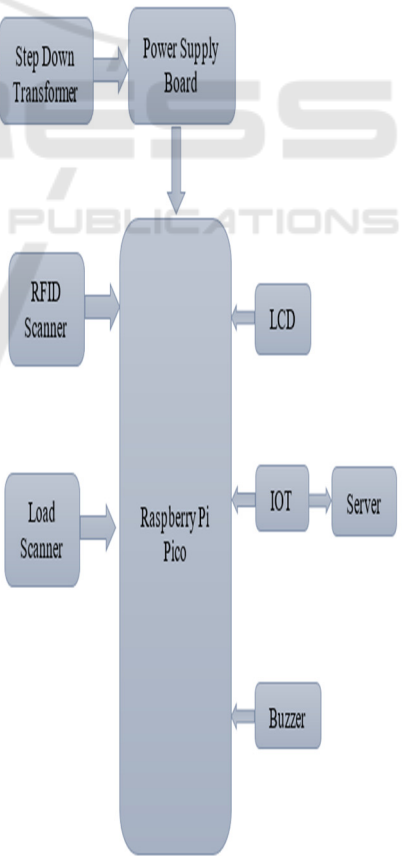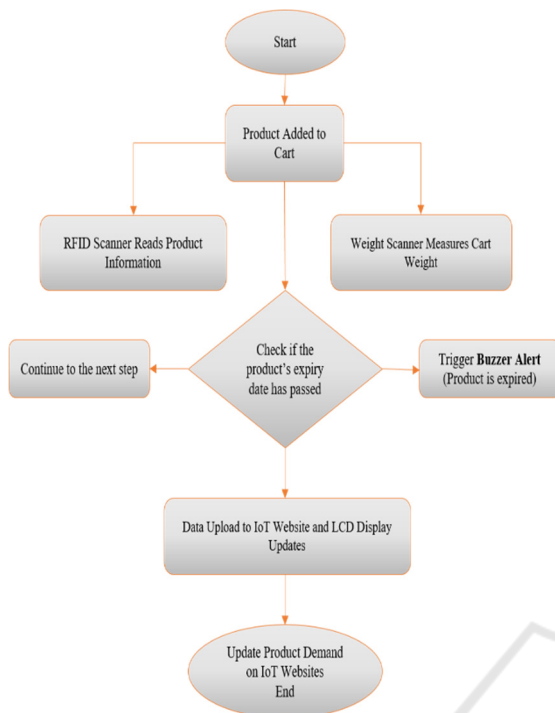

Figure 2: Proposed Method.
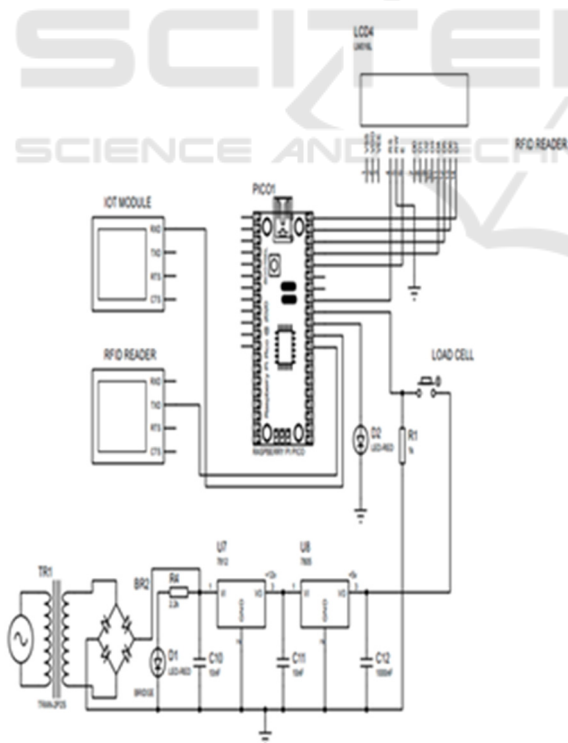
Figure 3: Flowchart of Proposed Method.

Figure 4: Circuit Diagram of Proposed Method.

4 RESULT

In terms of improving the shopping experience and streamlining store operations, the Internet of Things-based smart retail system has demonstrated notable advancements. The usage of RFID improved customer satisfaction by speeding up and streamlining processes. Customers were able to make well-informed selections thanks to real-time notifications regarding product expirations and payment restrictions. By using tailored advertising to notify customers of overloaded carts, the weight tracking technology improved safety.

5 CONCLUSIONS

We propose a safe smart retail system based on RFID in this article. UHF RFID is being used for the first time to enhance the shopping experience while addressing security concerns as part of a smart retail system. We build a prototype to assess the system's performance after carefully developing the entire system. We create a secure communication protocol and offer security research and performance assessments. Our research is at the forefront of developing a smart shopping system, and we believe that RFID technology will be utilized in stores in the future. Future study will concentrate on enhancing the current system to increase efficiency. For instance, it will examine methods to lower computational overhead at the smart cart side and enhance connectivity without compromising security aspects.

6 FUTURE SCOPE

Mobile App Integration: Link a mobile app to the system to provide real-time tracking and alerts. Improved Inventory Control: AI can be used to forecast supply requirements and update inventory automatically. Self-Checkout expedites the checkout process by enabling customers to pay straight through the cart. Tailored product suggestions according to the user's previous purchases. Adaptability Features that help cut down on waste include tracking product expiration dates and offering discounts on things that are about to expire.

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