Smart Shopping System using IOT

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***Abstract*—This study's goal was to present a smart shopping system based on RFID technology and its proposed design and implementation. Smart shopping carts that the system in this Customers can utilize the navigation to search for the products they want, and while they shop, the billing information will be calculated, and promotional items will also be suggested. The automated shopping cart will recognize the products you put in it and add them to your bill. By using this strategy, customers can save time by skipping the lengthy queues at the checkout counters, and the store will be better supervised.**

***Index Terms*—FID reader, item, shopping malls, shopping cart, IOT**

I. Introduction

The radio frequency identification system (RFID), an automatic radio technology, is one of the most significant categories of information detecting devices. To identify things, record metadata, and control specific targets, machines and computers can use waves RFID is currently a very significant information technology advancement. Currently, RFID is used in a single way, however it has multiple applications depending on what it is used for. As a result, the adoption of RFID improves the efficiency and convenience of these procedures The Internet of Things (IoT) is a vast network architecture that connects real and virtual things through data collection and communication capabilities. This procedure covers object identification as well as the foundation's sensor and connectivity capabilities for creating independent, cooperative apps and services.

These functions enable large levels of autonomous data collecting, event transfer, interoperability, and network connectivity. The purpose of this study is to propose a smart shopping system that makes shopping easier by using an RFID device that is mounted on shopping carts to help customers with their purchase activities. The technology will show the items that are available in the store and will also let customers know where the items they want to buy and the ones they put in their shopping cart are. Thus, this clever method has the potential to enhance and make the customer's purchasing experience more easy, joyful, and time-consuming.

II. Literature Survey

S. Lakshmanachari, G. Avanthi, Rajeev Ratna Vallabhuni suggested using RFID technology to speed up the billing process. The mobile button is tapped to add or remove products from the basket. The item's expiration date will also be displayed while it is being read. The red led will indicate and the buzzer will sound if the item has an expiration date. We proceed to the charging area when we have finished our shopping. The information about the items is transmitted to the central billing server, which will compute the total cost of the things purchased and show it on the website. Direct payment of the sum without having to wait will be simple.

Ajay Kumar and Shlok Srivastava Utkarsh Gupta proposed an innovative smart shopping center that uses a device mounted on shopping carts to assist customers, displaying the items available in the store, alerting them to the availability of the item they wish to purchase and has added to their mobile application's shopping cart, and offering a platform for automatic billing of the item's customers pick up and keep in their trolleys. The Smart Shopping Center may improve and make the customer's shopping experience more enjoyable, comfortable, effective, and time-saving.

Ruinian Li1 , Nicholas Capurso1 , Jiguo Yu2, , Jason Couture1 , and Xiuzhen Cheng proposed the server should be able to identify where each shopping cart is located and direct customers to the items, they are interested in. To address this, we use the zig-bee gateways to locate a shopping cart using the triangulation technique . tracking merchandise for the store, the state of the store's inventory should always be known to the server. To enable the shelves to keep track of the things and provide the server a count of the products, we suggest installing RFID readers on the shelves

Mekruksavanich,S proposed system that can inform the user where various items on the shelves are located, as well as those who have placed to their basket. It was designed to give automatic payment with the RFID components related to each product and payment through the application's interface. As a

result, customers won't have to stand in line to calculate and pay for their bills, making it possible for them to get the goods they want. The suggested approach offers significant cost advantages to the businesses in addition to being dependable and time efficient for the clients.

Xiaoying Kong, Javad Rezazadeh, and Kumbesan Sandrasegaran. This research created a framework for smart shopping malls based on four components: location of everything component, data collection component, data filtering/analyzing component, and data mining component. Furthermore, we developed a brand-new localization method dubbed "location orbital" that precisely locates moving objects at the moment (users or everything). Finally, a store implementation of the experiment was carried out to evaluate the location-based scheme's performance. Compared to WCL and APT approaches, the developed scheme could achieve 24.3% and 34.9% greater precision.

III. Methodology

The system is designed with automatic billing generation at the checkout counter in mind. Screens are also included in the shopping carts that feature RFID readers for scanning merchandise. The steps involved in using the smart shopping cart are detailed as follows:

An RFID reader and a motherboard with an LCD screen are both present in each shopping cart when a customer first enters the mall. The system is initialized, and the cart and the shopper's smartphone are synchronized when the power ON switch is depressed. On the LCD screen, the system's features are visible. The RFID reader is used to scan the product after the shopper selects it, after which it is added to the cart. The RFID creates the product ID during the scanning process. 3) A comparison between the created product ID and the server's database is performed. If a match is found, the smartphone's mobile application will display the price and name of the matching product. The products are added to the final bill, which is calculated and shown on the smartphone, using this application. If the customer decides to remove a product after adding it, there is also a delete option available. Two additional icons for comparison and promotions also show up on the cart's screen.

The screen will show all the promotions for that day when the customer touches the promotions button. When the comparison button is hit, products from other companies that are sold in the mall are priced against the one that was selected. The final bill for the payment is revealed after the shopper presses the FINISH button to end their purchasing. As a result, the checkout computer receives the final product information via serial communication, and the program on the checkout computer handles final invoicing.

IV. Result Analysis

A prototype was created to verify our idea and its functionality. It is possible to observe the circuitry used in the smart cart's RFID reader design. This module will make use of the item code that the RFID tag has saved. The objects in

Fig. 1.

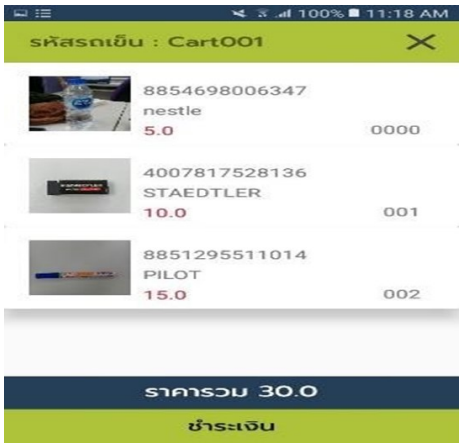

Fig. 2.

the shopping center are all equipped with the recorded tags. An illustration of a code for reading data from RFID tags. When an RFID tag is detected by the system, the UID and its length are confirmed. An RFID recorder's detailed circuit is shown. The model of the system prototype is shown in Fig. 1. The component will be installed in each cart in the mall. Furthermore, the smart cards can read RFID signals from tags on products on shelves as well as read and extract data from items that have been placed inside of them. The customer's purchases are finally validated at the checkout counters.

V. Conclusion

This study suggests a smart retail system that automates billing and payment utilizing RFID tags and a mobile management application. For quicker and more effective shopping, the technology gives real-time updates on the placement of products on shelves and in the customer's cart. Before entering

Fig. 3.

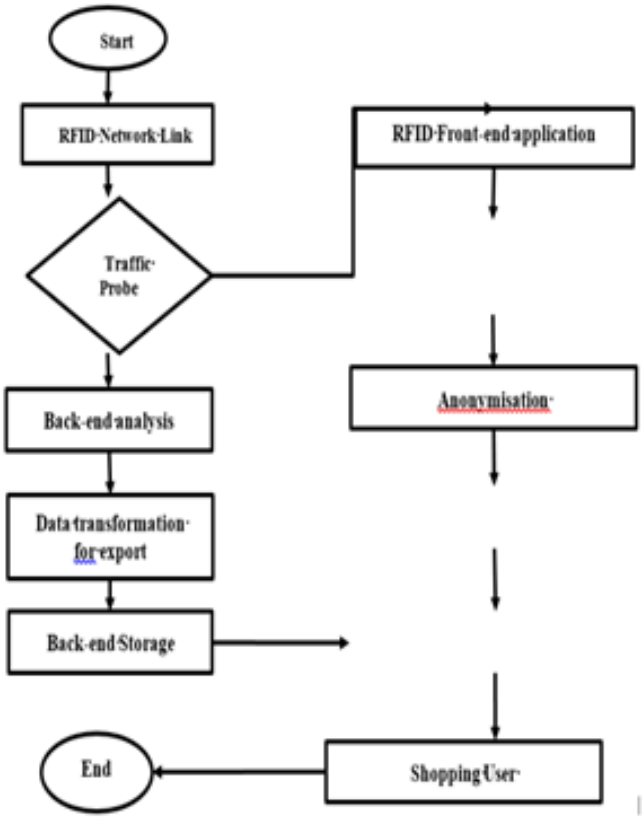

Fig. 4. Flowchart

the store, customers can make a shopping list in the app, and the system will send notifications when an item on the list is available. Customers benefit from time and money savings, and retailers have cost savings thanks to the system.

VI. Future Work

The following could be included in future development towards an IoT-based smart commerce system:

7.1.In-Store Navigation: Shopper Navigation IoT sensors can be used by the system to direct customers towards products and guide them through the store, making the purchasing experience more convenient and enjoyable.

7.2.Data Analytics: With IoT, retailers can gather and analyze a large amount of data on consumer behavior, preferences, and buying trends. This information can be used to improve the shopping experience and to create more targeted marketing campaigns.

7.3.Enhanced Inventory Management: IoT can help businesses track inventory in real-time, reducing the chance of overstocking or understocking and resulting in better inventory management. As inventory levels drop below a predetermined level, the system may monitor stock levels and automatically send out alerts. In general, IoT-based smart retail systems' future work will entail utilizing cutting-edge technologies like artificial intelligence, machine learning, and data analytics to give customers a more customized, effective, and delightful shopping experience.

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