Smart Shopping Trolley System using IoT

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Abstract- Currently, billions of consumers shop at large in shopping mall stores for their everyday necessities. In today's life, purchasing has become a part of everyday life. On holidays and weekends, malls experience massive crowds. When there are exclusive sales and discounts, the urgency is intensified. Here we will use IoT based technology for people buy various things and place them in a trolley. When they have completed their order, they must pay at the billing desk. The Bills generated by a RFID reader which is a time-consuming procedure that leads to long queues at billing counters. The key objective is to build a framework that can be used in shopping malls to fix the issue described above. Both trolleys would be fitted with the system. It will require an RFID reader; RFID tags would be found in many of the mall's goods. When a consumer places items in the trolley, the code is read, and the price of certain items is saved in the admin portal. When we add items to the cart, the device depicts the item's name, number, expiration date, and rate, which is then applied to the overall bill. As a result, billing will take place within the trolley itself. The complete bill data will be passed to online portal Wi-Fi Module with trolley id, and we will be able to pay the balance either online or at bill counter by scanning the RFID tag placed in the trolley. In-season inventory reductions are often applied in transactions through admin, and item stock may be recorded. Intelligent Carts and automated recognition systems are being utilized by merchants to enhance the efficiency of their offerings and to boost market demand, enabling them to save time and money.

1 Introduction

Technology has a major impact on human life. The evolution of e-commerce has altered our consumer patterns and styles during the last decade. E-Commerce and the Internet are inextricably connected. Online shopping has become feasible thanks to the Internet, advertisement, and promotion. Because of the presence of specialized sites such as Amazon, Julie Chic, Integra, among others, online shopping has spread. However, the presence of e-commerce has not hindered the expansion of conventional markets. The market is a real-world location where a vendor and a buyer connect in terms of resources and merchandise sales. Different methods have arisen to establish sourcing, where there are several trolleys that are used in different forms such as mobile grocery carts, infant strollers, and shopping carts, where the advent of entrepreneurial thinking leads to the increase of trade transfers dependent on the selling and buy. When shoppers realize precisely how much they are spending, they're more willing to cut corners on product names, and they are spending more, people left the store satisfied than those who didn't get this information. Non-budget consumers, on the other side, are more frugal because of this real-time shopping input. They pay 19 percent less on average and buy fewer national labels and more inexpensive supermarket brands. Except for an integrated tablet and detector installed near the shopper, the shopping cart appears like every other. When a shopper swipes there shopping card, his buying background is usable for a number of reasons, including providing a recommended shopping item, alerting to deals, and warning about perishables bought a month before. While retailers and customer advocates are becoming more interested in smart
shopping carts, they are concerned about how real-time spending input can affect purchasing behavior. Budget shoppers are motivated to invest more as they get real-time purchasing reviews. This input, on the other side, causes high-budget consumers to pay fewer. Furthermore, smart shopping carts improve budget shopper intentions while retaining them for high budget shoppers. These results point to significant gaps between low- and high-budget shoppers that are yet to be investigated. They also have significant consequences for both infrastructural and internet stores, as well as software creators.

2 Background Study

Utilizes RFID and WI-FI contact to build a centralized and automatic billing method. The RFID tag attached to each item. A Product Identification System is mounted in each shopping cart, which includes a microcontroller, LCD, RFID, and WI-FI module. The buying commodity details is interpreted by an RFID reader on the shopping cart and sent to the billing counter through the WI-FI module. The billing system obtains cart details and EEPROM records, and then consults the inventory database to determine the cumulative number of purchases for that cart. This device is specifically associated with resolving shop queues. The smart shopping trolley programmed in provides a central billing mechanism for supermarkets and malls that is automatic. The customers will not have to queue near cash registers to pay their bills if they use PID (product identification). Because the detail about their ordered product is passed to the admin billing system. The customers may also pay their bills with credit cards. In the proposed method is incredibly depend, authentic, trusty, and time efficient. They would be a decrease in the level of wages paid to workers, as well as a decrease in fraud. Furthermore, the device is incredibly time efficient.

2.1 Proposed system model

A society accepted revolutionary items is one that improves our daily comfort and productivity. The metro cities, buying and shopping at broad malls has been a regular occurrence. On holidays and weekends, these malls would be crowded. People buy various things and place them in a trolley. The payments must be rendered at the billing counter until the purchase is done. The cashier at the counter place the bill using a RFID scanner, which is the time reducing procedure that result in a length queue at billing counter. We use an RFID reader at the trolley side in the proposed scheme, and each commodity in the store has its own special RFID tag with unique ID. When a consumer puts a commodity in the trolley, the RFID reader reads the tag connected to the product and transfers it to the controller. The controller calculates the commodity worth and shows it on the trolley's LCD display. We can then connect as many items as we like and review the overall bill on the LCD display. Here we use Add and remove button, if your mind say this product don’t need that time you click remove button it removed. After completing your shopping, click the upload button on the trolley's side to transfer the bill number to the counter section through Wi-Fi communication. The Wi-Fi receiver got the bill number and sent it to the PC, which displayed it in the Hyper Terminal. The key role of this project is to design an Intelligent Shopping trolley that uses RFID scanners to enable consumers to self-checkout and maximize efficiency time by reducing and minimizing time spent at the billing counter in supermarkets.

An Arduino Uno R3, RFID Tag, RFID Scanner, Wi-Fi Module, and an Electronic Display will make up the smart shopping trolley. The name and price of the product the controller gets displayed on the LCD of the smart trolley, where people can see the item data, store the product price and the total billing data, microcontroller memory is used in the trolley.

These modules are checked for functionality before being incorporated into a smart sealed device. Customers at grocery outlets will profit from the smart shopping trolley it will help reduce checkout lines. The customers will be required to search goods by themselves, and the number will be updated on the shopping carts LCD panel. This would benefit department stores because more shoppers would love their customer experience and buy more often as a result. Large enough for shoppers with shopping carts to walk across during the creation and discussion of the intelligent shopping cart.
RFID Tags:
RFID reader and have a lower cost when compared to active tags. When the tag makes contact with coverage range of RFID reader transmits radio–frequency waves to the tag which emits the waves back to the reader for the identification of an article.

RFID Reader:
Trolley is reinforced an RFID reader, and the type is used is RFID reader which can also write data into the tags if required and can be directly loaded into the reader module for modulation and demodulation of signals.

LCD Display:
A 16˟2 LCD screen is used for displaying the information. The LCD screen can display a multitude of alphanumeric characters and graphics on its screen. It is connected to the I/O port of ATMEGA328P chip and can display information in real time.

WI-FI Module:
The RFID scanner from the PC is transferred to Arduino Uno through WI-FI module. We used WI-FI module in which data serially transfer to the WI-FI receiver. In smart trolley system, the PC is used to send RFID data serially to the Arduino WI-FI module when a button application.

Figure 1: Block Diagram for Smart Trolley
We use smart trolley following method instead of the queue following method. To avoiding the requirement of RFID transmitters is placed at shopping trolley to collect information of the admin side of the cart and the identification. So, there will be an RFID transmitter that the customer can carry the product.

The greater the gap between aisles/bays, the more efficient RFID transceivers is used, or RF transceivers may be used instead. Furthermore, the place of the RFID Trans-receivers is on the smart shopping cart and in would be critical to shopping carts proper operation. Furthermore, since RFID technology depends on line of sight, it's crucial to make sure and aisle's entry and exit are visible.
3 Results and methods

We will create one web site, that website we use trolley interfacing and admin side. If we generate the bill though the controller it’s to transfer the items to admin stack section. If you don’t have that product you will give the cancel button, it’s cancelled. In admin portal we will created one column that one is discount for the products shown in Figure 4.

![Figure 4: Login page on Trolley Section](image)

The login page gives the detail and design about how the login was created and it is given with the trolley section login consist of the product name and the expiry date and cost of the product with the update to the bill generation.

![Figure 5: Login page on Admin Section](image)

Figure 5 shows the first page created after the login page that gives about the trolley products transfer to the admin section.

![Figure 6 list of the products to display the LCD](image)

When the shopper puts a product named “BOOST” into the smart trolley, its shows Boost and its cost, expiry date and KG.
Once the customer purchase is over, the data shows in login page. That time shopper will verify the buying products.
Figure 9 an admin can check the database of administer at any point. The admin can check the total bill generated by all users. In this page discount offers also available. And the page Stack and clear portal also valuable.

Figure 10 Trolley side bill generation

In trolley puts all product items, once you confirmed all the items you click bill generation button it generated the admin side. And, product details displayed in LCD display. The LCD display fixed in the smart shopping trolley.

4 Conclusion

In this project, we have designed Smart Trolley System Using IOT. Now there is no need for the customers wait in the queue line and wait people turn for scanning of the product items. Especially during weekends or holiday times, there will be no time wastage in waiting in the queue. The customer can do billing directly through the application or even at the billing counter. So, supermarkets or shopping malls can use this concept, which will attract a greater number of customers and make the shopping effortless for the customers.

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