Implementation of Secure Smart Cart for Automatic Detection of Object using Arduino and RFID

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Abstract: People when they are shopping at a large shopping complex, people frequently go over their allotted spending limit. Moreover, they end up in long waits at the end of their shopping waiting for the things to be scanned and billed. The a fore mentioned issues are easily solved by the Smart Shopping Cart. It assists the customer in ensuring that he stays within his predetermined budget and only purchases the necessities for himself. Additionally, the system helps to reduce long lines at the checkout counter because the products have already been scanned; the customer only needs to pay the bill and bag the items bought. The method is advantageous for shopping malls because it can assist in lowering the number of billing counters, which will help to drastically lower labor costs.

Index Terms **- RFID, Arduino, LED/LCD, IR Sensor, Motion Sensor, Weight Sensor.**

I. INTRODUCTION

For The innovation of technologies advances at an exponential rate in this period of fast change. Many businesses are making investments in innovations that guarantee consumer happiness at all levels. Technology in customer service, which offers new and reliable systems for customers, is one of the most common developments. Shopping carts, usually referred to as shopping trolleys, are a way to temporarily transfer your purchases before checking out. Since their creation, shopping carts have seen relatively few alterations. Most of the expansions have been made to change its weight and capacity. But as technology has advanced, some of the company's research has led to the creation of a user-friendly shopping system.

The shopping cart, for instance, has a touch panel and a RFID Reader attached. The customer can use the touch panel to learn about the details, promotions and the location of products. In addition, when a consumer places an item into the trolley, the RFID reader scans it, and the details of the product is presented on the touch panel display. Without waiting in a long line for the payment process, the consumer will only need to make a payment depending on the amount displayed to the cashier. The described upgrade to the shopping cart can save client shopping time, money and provide a better shopping experience.

Due to primarily fast expanding application to track products through the food supply chain, RFID and associated technologies have seen an explosion in attention over the past two years. Due to the relatively high cost of RFID deployment and the extremely low profit margin of supermarket goods, item-level tagging was not yet practicable, therefore these applications instead monitor Store-Keeping Units (SKU) rather than specific product items.

One can easily imagine a scenario in which every item in a supermarket is marked with an RFID label, shopping carts have RFID readers and perhaps even on-board computers that can identify items placed in the cart and display information and promotions that have been wirelessly or wired retrieved from the system's back-end. The introduction of RFID technology at the item level would also enable fast checkout lanes that scan all merchandise at once, eliminating lines consistently cited as one of the worst elements of grocery shopping.

II. PROBLEM STATEMENT

As is common practise throughout India, a customer must go to the billing counter at every store or mall to make a purchase. An employee of that store or mall will then scan the customer's RFID tag or barcode and issue a bill.

After that,

1.we must pay by cash or credit or debit card,

2.It is time consuming,

3.Need access of staff,

4.It is difficult to keep the record of consumer,

5.Sometimes lacks in the security.

III. LITERATURE REVIEW

An RFID reader and a touch-screen tablet are included in this project proposal. A website must be able to let users build new shopping lists in order for this system to work. By scanning each item in the customer's basket, the self-checkout component saves them from having to wait in line at the register. [1] This project includes a motion sensor, LCD, RFID reader, Zigbee, and more. When a user places a product in the cart, an RFID reader will detect the product's code. Buzzers are used to sound the alarm in the event of any fraudulent activity, and ZigBee technology is used to transport the created bill to the counter. analysing the effects of the various thinning techniques on an OCR system and compiling statistics from their performance on big data sets. [2] This paper offers suggestions for creating an intelligent shopping cart system that will record online purchases and transactions. Additionally, the system will offer recommendations based on the purchase. For anti-theft purposes, an RFID reader is installed at the exit. [3] Each trolley will be outfitted with an RFID reader and an LCD screen that will show all the product information as part of this project proposal. The Zigbee module will transfer the Bill to the counter. In this project, devices such as RFID tag, LCD, RFID reader, barcode reader, trolley, and Zigbee were used. [4] RFID, Reader, LCD, Buttons, Wifi Module, PIC, Microcontroller, and Indicator are among the materials used in these projects. The whole amount the customer wants to spend is entered into the micro system that is built into the smart shopping cart, which is presented in this paper as an intelligent smart cart system. [5] RFID and Zigbee components are utilized in these projects. Based on customer purchase history from a centralized system, these systems will provide suggestions for things to buy. Every item in the store will have RFID tags, and every cart will have an RFID reader and Zigbee attached to it with this system. A centralized system will be used for online transactions and recommendations. Additionally, an RFID reader for anti-theft purposes will be located at the exit door. [6] With this project, a user can instruct a virtual assistant to automatically remove items from a shopping basket to keep costs down. By deleting the least important item from the shopping cart, the virtual assistant chooses which goods to keep. E-commerce, a virtual assistant, voice commands, and smart speakers are among the components used. [7] When you use the trolley for shopping, by voice commands the sensor attached on the trolley reads information each time you place an item inside. It sends the data immediately to the main server. After then, since the counter has your complete information, you can proceed to make a payment. [8] This project idea uses integrated electrical hardware, such as an Arduino Mega, OLED Display, RFID reader, Wi-Fi module, and others. To use the cart, a user must first register on the market's internet page before receiving a smart card. The smart card will contain money that has been converted via an online website, and users will need to swipe the card each time they use it. [9] A cart that automatically follows the user and offers the possibility of automated billing was built in this project, which incorporates several subsystems in the IOT area. It transmits data to the cashier's safe point, tracks the movements of the customer, and immediately follows. The Coco motion function is used. [10] The store provides its loyal customers with membership cards, which have an RFID tag attached to them. A barcode scanner is used to generate the barcode that is transmitted to Arduino via the Bluetooth module. [11] As soon as a consumer enters the mall and uses the trolley, the proposed system is put into operation. Each RFID reader on a trolley is independent. As a result, the consumer with the associated RFID card, also known as a customer card, is followed by the trolley. The RFID tag and ultrasonic sensor regulate how the system moves. The QR scanner reads the QR code on the item the consumer has taken, using image processing, and shows the item's pricing and other details. [12] In this work, the author develops a system that includes several different technologies, including RFID, GSM, OTP, automatic billing, PIC, and Zigbee. The shopping item can be read by the reader in this system, and an LCD screen shows the total cost of the items. [13] In this article, the author created a system that featured smart billing and a smart trolley. When a new item was added to the cart, the system computed and updated the customer bill, adding additional functionality. [14] In this study, RFID was employed for billing purposes together with other shopping cart-related parts like PCB, Wi-Fi, and a power supply. [15]

IV. FINDINGS AND DISCUSSIONS

Mainly every paper were focused on creating a smart cart to make it more convenient for people to do shopping without worrying about their budget and standing in a long queue for billing on billing counters. Moreover, every project has included and focused over the use of RFID has a best suitable solution for addressing this issue.

As per our findings we have found that every project has it's unique value and a Special and helpful option for the customer who are going to use it but there isn't a complete package of a convienient, easily accessible, helpful , smart, and most importantly a secure cart we in our project are working to provide all these features at one place which will make it easier for the customer to pursue their shopping exceptionally well and this will also provide them a new and better experience.
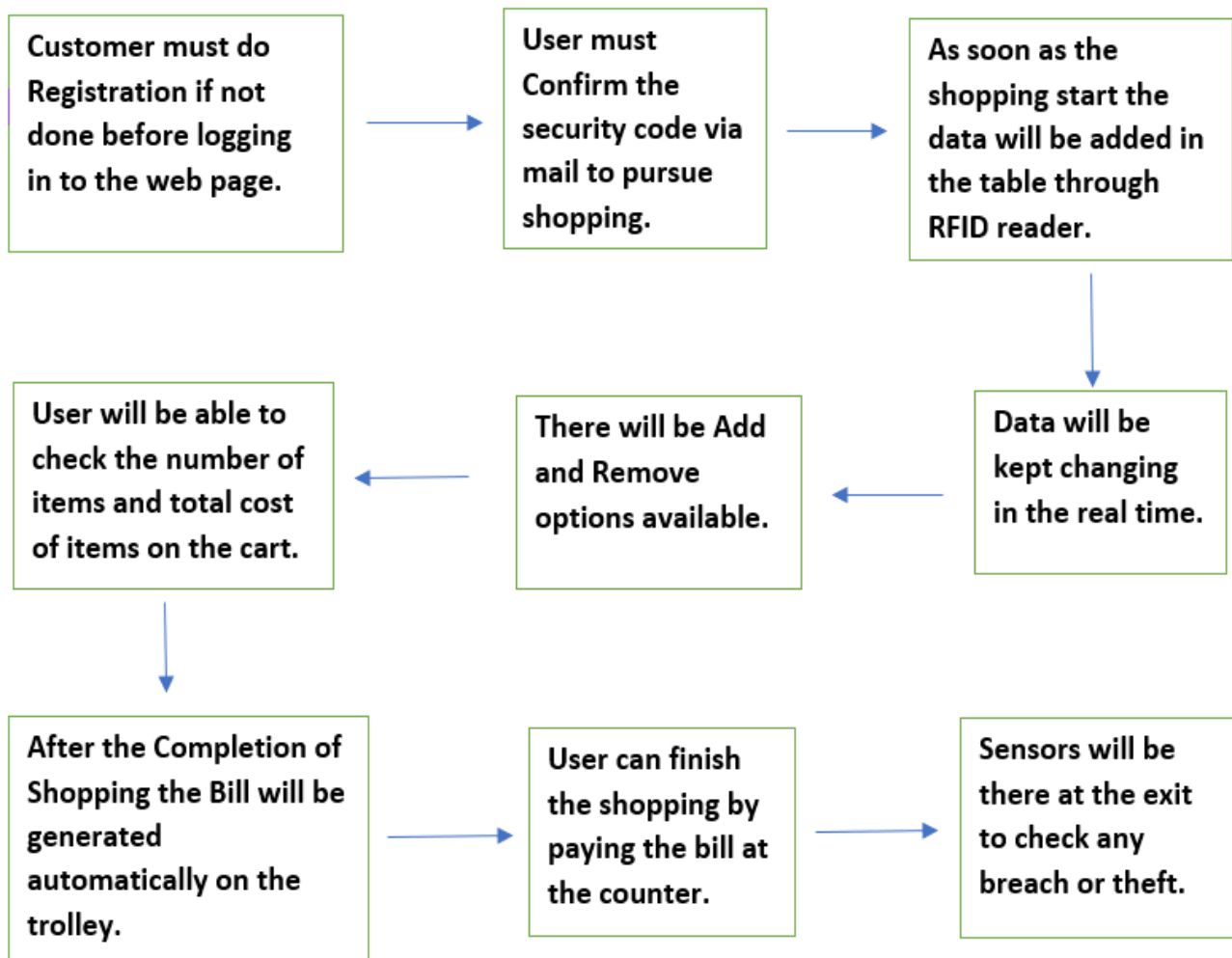
V. PROPOSED WORKFLOW

Fig : Workflow of Secure Smart Shopping Cart.

VI. CONCLUSION

The clients do not need to wait in line or for their turn to scan the product items when using this Smart Trolley System. The time spent standing in line is not wasted, especially on weekends or during festival season. Only those customers who are registered and whose IDs are entered into the smart cart may use it. The customer must only pay at the billing counter. In order to increase client traffic, supermarkets and hypermarkets employ this concept as a business strategy.

This will create awareness among the people and will make them familiar with the new technologies and thus we can implement new features also. Overall it will provide a new and wonderful experience to the user and can result in increase in the amount of sale as this technology will save time , save efforts, save extra labour cost also it provide safety to both the consumer and the shop owner and creates a medium of trust between them. Mainly according to the findings, we have focused on the safety and privacy from both the point of view be it of consumer or the shop owner

The customer will be able to scan the products within the cart and receive an immediate bill total and all the other product details on the cart itself. This would speed up consumer checkout from the billing counter. The fact that fewer people are needed at the billing counter is an additional benefit for the shop owner and the amount of profit generation will be more as compared to previous. The Secure Smart Shopping Cart differs from other designs.

Additionally, there is room for development. One feature would allow customers to input their shopping lists, ensuring they don't forget anything. Due to several characteristics, this shopping cart distinguishes apart from other models in the market.

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