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Smart Trolley using Arduino UNO

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A B S T R A C T

The process of checking out at stores can often be tedious and time-consuming due to issues with item billing, resulting in long queues. To address this problem, a solution has been proposed in the form of a Smart Trolley. The Smart Trolley is a technological solution that aims to streamline the shopping experience for customers while also improving inventory management for stores. The project involves the development of a trolley that is equipped with a variety of sensors and scanning technology, which allows it to scan and track the items added to it. One of the primary benefits of the Smart Trolley is that it eliminates the need for manual item scanning at checkout. Instead, the trolley's technology automatically detects and tallies the items as they are added, providing customers with a seamless checkout experience. This not only saves time for shoppers but also helps to reduce long queues and congestion at checkout counters. In addition to improving the shopping experience for customers, the Smart Trolley also offers benefits for stores. By automatically tracking items as they are added to the trolley, the technology enables stores to manage their inventory more efficiently. This can help to reduce waste and optimize stock levels, ultimately leading to cost savings for the store.

1. Introduction

The Smart Trolley project is an innovative system designed to improve the traditional shopping experience. The project combines the power of micro controller technology, load sensors, and RFID technology to provide customers with a seamless and convenient shopping experience. The system is equipped with a load sensor that can detect the weight of the items added or removed from the trolley, and an RFID reader that can scan the tags on the items. The Arduino UNO micro controller processes this data and displays the total weight and prices of the items on an LCD screen. Additionally, the system has a user-friendly interface that allows customers to scan items using a barcode scanner or an RFID reader and view their prices and details on an LCD display. The Smart Trolley project aims to revolutionize the traditional shopping experience by automating the weight and checkout process, allowing customers to easily track their spending and avoid long queues. Moreover, the RFID technology enables retailers to manage their inventory and track the movement of items in real-time, reducing the chances of theft and increasing efficiency. This project has the potential to significantly improve the retail industry, enhance customer satisfaction, and increase sales. This introduction provides an overview of the Smart Trolley project and its potential benefits in improving the shopping experience with the use of Arduino UNO, load sensors, and RFID technology.

1.1 Aim of the project

The aim of the Smart Trolley project using Arduino UNO, load sensor, and RFID technology is to provide a more efficient and convenient shopping experience for customers while improving the operational efficiency of retailers. The project aims to automate the weight and checkout process by integrating load sensors and RFID technology into the trolley. The load sensors will detect the weight of the items added or removed from the trolley, and the RFID reader will scan the tags on the items, enabling the system to calculate the total weight and price of the items in real-time. Additionally, the project aims to enhance customer satisfaction by providing a user-friendly interface that allows customers to scan items using a barcode scanner or an RFID reader and view their prices and details on an LCD display.

The project also aims to improve the operational efficiency of retailers by enabling them to manage their inventory and track the movement of items in real-time. With the help of RFID technology, retailers can identify the items added or removed from the trolley and update their inventory in real-time, reducing the chances of theft and improving efficiency.

2. Literature Survey

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[6]. S.K. Shankar; S Balasubramani; S Akbar Basha; Sd Ariz Ahamed; N Suneel Kumar Reddy - Smart Trolley for Smart Shopping with an Advance Billing System using IoT, Publisher: IEEE

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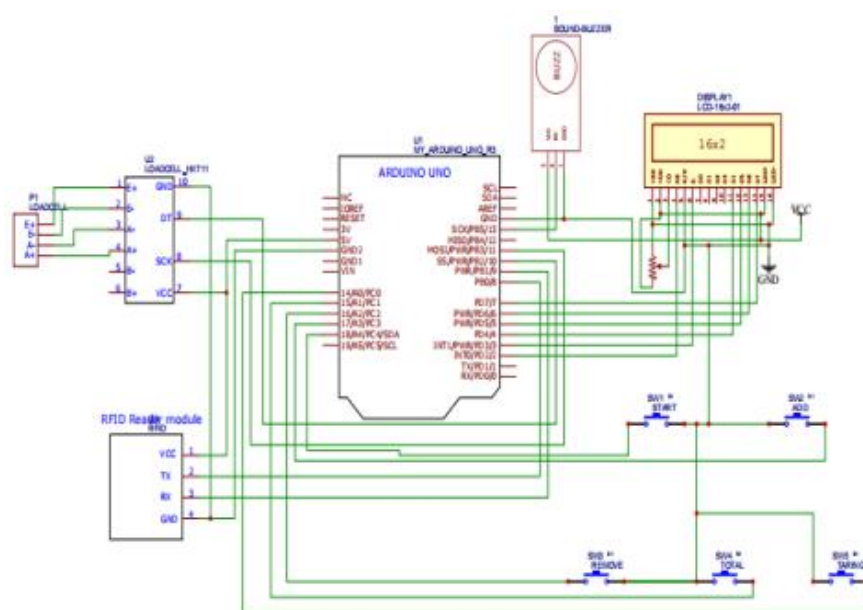
3. Methodology

Fig - 1 Schematic Diagram

#Starting process of the system

Step-1: To activate the system, the initial step is to turn on the first power switch, which provides power to the entire circuit. Afterward, the system gets powered up, and the display shows a message saying "Welcome." Within two seconds, the display changes and shows "Smart trolley," and the load cell starts detecting the weight in the trolley.

Step-2: To ensure accurate weight sensing, it is necessary to push the Weight Taring Push button switch, which resets the net weight in the system to zero.

Step-3: Once the weight taring process is complete, the Start Push button switch needs to be pushed to initiate the process. This action starts the system.

#Adding and removing items

Step-4: To begin adding items to the trolley, the user needs to push the Add Push button switch. While placing the items in the trolley, the EM18 Reader module reads the tag attached to each item, and this data is transmitted to the Arduino UNO dip. Simultaneously, the load cell measures the weight of the items in the trolley and sends the information to the Arduino UNO via the HX711 load cell module. As the items are added, the LCD display updates to show which item has been added. The data read by the EM18 Reader module, including the weight and total cost, is also displayed on the LCD screen.

Step-5: Similarly, to remove items from the trolley, the user needs to push the Remove Push button switch, which initiates the removal process. As items are removed from the trolley, the EM18 Reader module reads the tag attached to each item, and this data is transmitted to the Arduino UNO dip. At the same time, the load cell senses the weight of the remaining items in the trolley and transmits the information to the Arduino UNO through the HX711

load cell module. The LCD display updates to show which item has been removed, and the data associated with the removed item is subtracted from the total data displayed on the LCD screen.

#Chance of fraud

As mentioned above, the system allows for items to be added or removed from the trolley. However, if an individual tries to steal items by adding them to the trolley without scanning or covering the RFID tag on the item, the load cell detects the net weight of the item and sends this information to the Arduino UNO via the HX711 reader module.

Fig-2 Adding Items

End process of the system

Step-6: To obtain the total bill, the user must press the Total Push button switch. The Arduino UNO dip will then compare the weight readings obtained from both the load cell and the EM18 Reader module. If the weight difference is within 100 grams, the system displays the total weight and corresponding bill on the LCD display.

However, if the weight difference is greater than 100 grams, indicating a possible case of fraud, the system activates a buzzer to alert the user.

4. Results and Conclusion

The Smart Trolley project significantly reduces the time spent at the billing counter by automating the calculation of the total bill as items are added to the trolley. This means that instead of manually scanning each item and entering its price, the system automatically calculates the accumulated cost in real-time. As a result, customers can simply place items in the trolley, and the Smart Trolley system will keep track of the prices, providing an accurate and up-to-date total bill. This automation eliminates the need for manual calculations, reduces waiting time at the billing counter, and provides a more efficient and convenient shopping experience for customers.

Advantages of smart Trolley

Improved shopping experience: With the Smart Trolley project, customers are able to have a more convenient and enjoyable shopping experience. The trolley's ability to weigh items and provide real-time stock availability information makes it easier for customers to find and purchase the products they need, while the RFID technology provides a quick and easy checkout process.

Increased efficiency: The use of RFID technology in the Smart Trolley project improves the speed and accuracy of inventory management and reduces the risk of theft, resulting in increased efficiency for retailers.

Customizable and adaptable: The use of Arduino UNO DIP as the central controller provides a Customizable and adaptable platform for the Smart Trolley system, allowing for future improvements and enhancements to be easily implemented.

Cost-effective: The Smart Trolley project using Arduino UNO DIP, load cell, and RFID technology is a cost-effective solution for retailers, as it reduces the need for manual labor and reduces the risk of errors in inventory management and checkout.

Environmentally friendly: The use of the Smart Trolley project can reduce the use of paper and plastic bags in the checkout process, contributing to a more sustainable and environmentally friendly shopping experience

Fig-2 Trolley with weight

Fig-3 Trolley with equipment

5. Conclusion

In conclusion, the Smart Trolley project offers several advantages over traditional shopping methods. It provides a more convenient and efficient way for customers to shop, while also offering personalization and improved inventory management for stores. Additionally, the Smart Trolley project has the potential to reduce theft and offer a contact-less shopping experience, making it particularly relevant in the current COVID-19 pandemic. As technology continues to advance, it is likely that we will see further development and implementation of smart trolley systems in retail stores around the world.

6. Future Scope

The Smart Trolley project using Arduino UNO DIP, load cell, and RFID technology has a lot of potential for future development and enhancements. Some of the possible future scopes for the project are:

1. Mobile application integration: The project can be further improved by integrating a mobile application that can allow customers to view the products, their prices, and stock availability in real-time, without the need for scanning each item. The mobile application can also provide personalized shopping recommendations and coupons to customers.

2. Augmented Reality integration: The project can be improved by integrating augmented reality (AR) technology, which can provide customers with a virtual shopping experience by allowing them to visualize how a product would look in their home before making a purchase.

3. Voice assistance: The project can be further developed by integrating voice assistance that can help customers in finding products, provide information on promotions and discounts, and help with billing.

4. Cloud-based data analytics: By using cloud-based data analytics, retailers can analyze the shopping behavior of customers, inventory management, and billing, which can help them to make informed decisions and provide a better shopping experience for their customers.

7. References

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