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A Review Paper on Smart Shopping Trolley

Vivek Prakash Dagade^{*1}, Om Shivaji Patil^{*2}, Saurav Sanjay Mali^{*3}, Prof. Anjum A. Attar^{*4}

Student, Department of Electrical Engineering, NMCOE, Peth, India^{*1-3}

Assistant Professor, Department of Electrical Engineering, NMCOE, Peth, India^{*4}

ABSTRACT: Shopping is simple but waiting on a bill counter makes shopping too boring and a tedious task. Huge amount of rush plus cashier preparing the bill with barcode scanner is too time consuming and results in long queues. This innovative project consists of an automated billing system which can be placed within the shopping trolley. This automated payment system consists of a RFID reader which Arduino controls. So, whenever the shopper puts any product in trolley it is detected by the RFID module and is displayed on LCD along with the price of the product. As the shopper goes on adding products, all products are detected by the module and therefore the price will increase accordingly. In case if customer changes his/her mind and doesn't want any product added in the trolley he/she can remove it and the price added will be deducted automatically. At the end of shopping the shopper will press the button which when pressed adds all the product along with their price and gives the total amount to be paid. At exit for verification the shopkeeper can verify the products purchased with the help of master card. Hence this technique is an appropriate method to be used in places like supermarkets, this will help in reducing manpower and helps in making a better shopping experience for customers.

I. INTRODUCTION

In metro cities purchasing and shopping at super shops, big malls is a daily activity. We have seen big lines for payment of the bill at malls on holidays and weekends. When there are special offers and discount the rush is also even more. Customers will purchase many items and put it into the trolley. After customers done the purchase, they need to go to billing counter for payment. At the billing counter the customer will prepare the bill using bar code reader which is a time-consuming process and will create the long queues at billing counters. All the products in the shop are attached with RFID tags. When a customer put any products in the trolley, its unique code will be detected and the price of those products will be get stored in memory. As we put the products into the trolley then costs will automatically get added to total bill. Thus, the billing will be done in the trolley itself. Total bill information will be transferred to PC by wireless Transmitter and receiver modules at the billing counter. When the customer purchases a product, she/he first scans the RFID tag of the product using the RFID reader and then put it into the trolley. While purchasing the products customer needs to scan the RFID tag of the product, a price of the product is taken and stored in the system's memory. Shopping carts in the supermarkets in day today shopping activities is now mostly visible.

II. GAP IDENTIFICATION

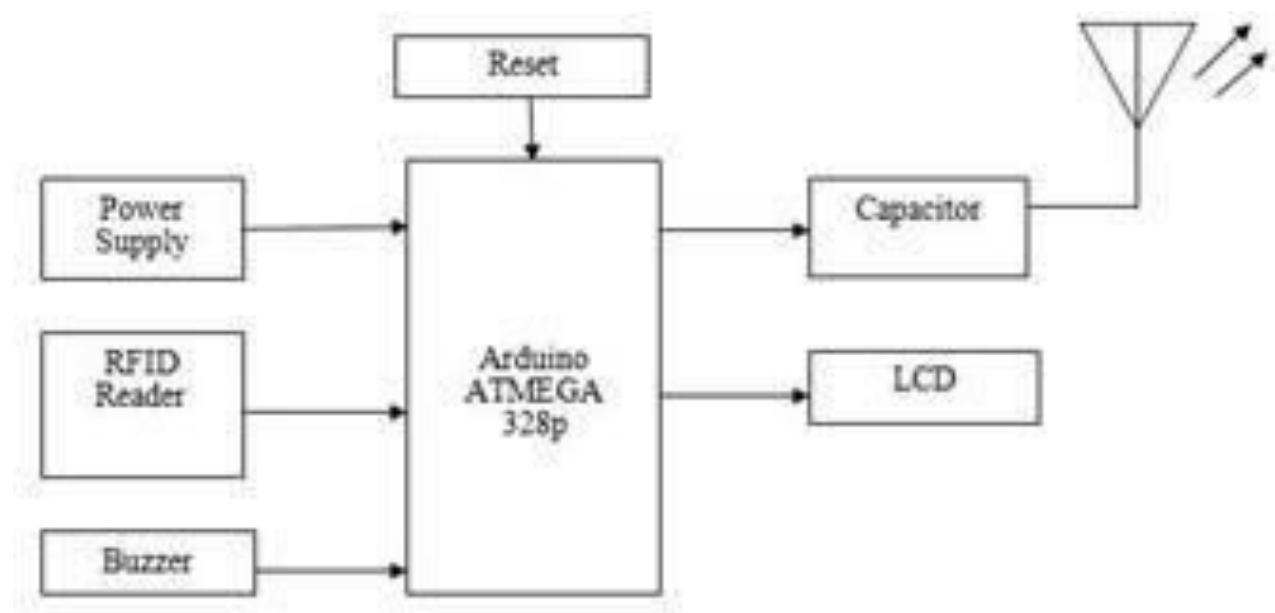
The Smart Shopping Trolley project faces several key challenges that need to be addressed for full-scale implementation. First, integrating RFID technology with existing retail systems could be complex and costly for stores still using traditional barcode scanners and POS systems. Additionally, not all products come pre-tagged with RFID chips, requiring retrofitting or partnerships with manufacturers to standardize tagging. The accuracy of RFID detection, especially in the presence of materials like metal or liquids, may also limit the system's effectiveness. Cost remains a significant barrier, particularly for smaller stores or developing markets, requiring cost-effective solutions and scalable deployment models. The user interface needs to be intuitive and accessible, particularly for non-tech-savvy customers. Autonomous navigation may struggle in crowded or complex store layouts, necessitating advanced sensors and navigation algorithms. Privacy and data security are also concerns, as the system collects transaction and location data, demanding robust encryption and clear privacy policies. The trolley's battery life and power management must be optimized to handle long shopping trips without failure. Furthermore, handling product returns or exchanges within the system could be a challenge, requiring integration of a seamless process. Lastly, immediate customer support for malfunctions and troubleshooting must be provided to avoid shopper frustration. Addressing these gaps through technology, cost-efficient solutions, and customer-focused improvements will be essential for the

success of the Smart Shopping Trolley system.

III. METHODOLOGY

- **Design Phase:** Detailed design of the solar power system, filtration unit, and control mechanisms. This includes selecting appropriate materials and components based on efficiency, cost, and availability.
- **Prototype Development:** Constructing the prototype based on the design specifications, integrating all components into a functional system.
- **Testing and Optimization:** Conducting tests under different environmental conditions to evaluate the system's performance, followed by optimization of components and processes to enhance efficiency and reliability.
- **Implementation and Field Testing:** Deploying the system in a selected remote area to assess real-world performance, including water quality, energy consumption, and maintenance needs.
- **Data Analysis:** Analyzing the data collected during testing and implementation to evaluate the effectiveness of the system and identify areas for further improvement.

SYSTEM SPECIFICATION AND BLOCK DIAGRAM:



IV. OBJECTIVES

- **Enhanced User Experience:** To improve the overall shopping experience with features such as personalized recommendations, easy product search, and interactive displays.
- **Reduced Physical Effort:** To make shopping less physically demanding by offering assistance with carrying items, navigating through the store, or even guiding users to the products they need.
- **Improved Accuracy:** To minimize errors in product selection and pricing by integrating technology that scans items and provides accurate information and pricing.
- **Data Collection and Analysis:** To gather data on shopping patterns and preferences, which can be used to personalize offers, manage inventory better, and improve store layout.
- **Safety and Hygiene:** To address health concerns by minimizing physical contact with surfaces and providing features that promote cleanliness, such as easy-to-clean surfaces or automated sanitization.
- **Cost Efficiency:** To reduce operational costs for retailers through automation and improved inventory management, potentially leading to lower prices for consumers.

V. SCOPE OF PROJECT

The project will focus on the design, development, and testing of a Smart Shopping Trolley system to enhance the retail shopping experience. The scope includes:

- Designing a lightweight, automated trolley with RFID technology to detect products and display real-time pricing.
- Integrating a user-friendly interface (LCD screen) for product details, price updates, and total amount calculation.
- Developing an autonomous navigation system to allow the trolley to follow the shopper automatically within the store.
- Ensuring secure checkout functionality with product verification and payment processing via RFID and master card.
- Conducting performance tests to evaluate system accuracy, mobility, and battery life under real shopping conditions.
- Analyzing the economic feasibility and environmental impact of implementing the smart trolley in retail environments

VI. CONCLUSION

In conclusion, the Smart Shopping Trolley project aims to transform the shopping experience by introducing automation and RFID technology. By automating the product detection and checkout process, it reduces wait times and improves convenience for shoppers. The system's ability to follow the shopper automatically and provide real-time updates enhances user experience. Additionally, it offers retailers a cost-effective solution with reduced manpower and increased efficiency. With successful testing and implementation, this smart trolley can make shopping faster, easier, and more enjoyable. Ultimately, it provides a modern, eco-friendly alternative to traditional shopping carts.

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