



Wireless Controlled Smart Trolley For Shopping Malls

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Abstract: In the fast-paced world of today, technology is constantly changing how we work, live, and shop. The smart shopping trolley is one such invention that is revolutionizing the retail industry. Smart shopping trolleys are transforming the conventional grocery shopping experience by fusing state-of-the-art technology with everyday ease. To increase productivity and consumer happiness, these sophisticated carts smoothly include features like automated checkout processes, tailored suggestions, and real-time inventory management. The main characteristics and advantages of smart shopping trolleys will be discussed in this introduction, along with how they could affect retail in the future.

Index Terms – Wireless , Smart , Shopping Trolley , Shopping malls , Sensor , Motor etc.

I. INTRODUCTION

The evolution of technology has permeated every aspect of modern life, including the retail sector. One such innovation is the smart shopping trolley, a cutting-edge solution designed to revolutionize the shopping experience. This abstract explores the concept, functionalities, and potential impact of smart shopping trolleys on both consumers and retailers.

Smart shopping trolleys integrate various technologies such as RFID (Radio-Frequency Identification), IoT (Internet of Things), and AI (Artificial Intelligence) to provide a seamless and personalized shopping experience. Equipped with touchscreens or mobile interfaces, these trolleys offer features such as product information, real-time promotions, aisle navigation, and automatic payment options.

For consumers, smart trolleys streamline the shopping process by providing instant access to product details, enabling efficient navigation through the store, and facilitating convenient checkout. Moreover, personalized recommendations based on past purchases or preferences enhance the overall shopping experience, fostering customer loyalty and satisfaction.

II. LITERATURE SURVEY

T. K. Das, ET AL.^[1] it is proposed to design a smart trolley which can take care of shopping and billing. By this, the customer can walk straightaway into the shop, purchase products using the smart trolley and walk out of the shop. He gets the e-bill through the mail, and he can view his purchase details using the shop's website. In order to realize this, we need an Arduino board, Radio-Frequency Identification (RFID) reader, RFID tag, LCD display, ESP8266 Wi-Fi module, database manager and a website to maintain product and customer details, which can be accessed by the admin anywhere in the world. This is an IOT based system where the trolley can interact with the network spread worldwide.

S. R. Rupanagudi et al.[2] , One of the major problems faced by consumers while shopping at a supermarket is the inability to locate items and also to carry goods to the billing counter. In this paper, we describe a novel cost-effective method to overcome these issues by creating a smart trolley using a web camera along with video

processing to complete the tasks. In comparison with previous methods which utilize RFID transceivers, our solution costs 10 times lesser than its predecessors and is environment friendly as well.

S. Maurya et al.^[3] The system consists of a smart trolley equipped with sensors and microcontrollers that interact with a cloud-based server and a mobile application. This involves designing the hardware and software components of the smart trolley, including the IoT sensors, RFID reader, microcontroller, display screen, and user interface. The system will communicate with a cloud-based server that stores and processes data from the sensors and provides real-time analytics for store managers. The trolley can detect the items placed in it and display the total cost of the purchase on an LCD screen.

S. Kowshika et al.^[4] The proposed Smart Cart in this paper, is capable of generating bill using IoT along with the mobile cart application. With the use of this mobile application and trolley, customer can make bill payment in no time. The smart cart uses the RFID tag and receiver to scan the product, load cell to prevent theft, LCD display and the Raspberry pi. Along with this the customer can also log in with the mobile app which will display the list of all the products mentioned and their amount. Once done, the customer can pay the bill through the mobile application.

Problem Definition

Inefficient and cumbersome traditional shopping experiences lead to long checkout times, inventory inaccuracies, and missed opportunities for personalized engagement. Existing solutions lack seamless integration of technology to enhance the shopping journey and provide real-time insights for retailers. There is a need for a smart shopping trolley solution that combines innovative sensor technology, robust data analytics, and personalized features to optimize the shopping experience for both customers and retailers.

III. OBJECTIVES

By using cutting-edge technology, a smart shopping trolley seeks to transform the shopping experience by streamlining procedures, improving convenience, and offering tailored services to customers and merchants alike. Important goals include of:

- **Streamlined Shopping Experience:** Make shopping easier by automating processes like scanning items, updating shopping lists, and instantly calculating total costs.
- **Enhanced Efficiency:** Cut down on waiting times and checkout times by integrating with current checkout systems and supplying precise inventory data.
- **Improved Customer Engagement:** To boost customer satisfaction and loyalty, provide tailored incentives, recommendations, and loyalty awards based on each customer's unique tastes and buying behaviors.
- **Data-Driven Insights:** Gather and examine information on consumer preferences, trends, and purchasing behavior to provide merchants with insightful information that will help them improve marketing and inventory control.

IV. METHODOLOGY USED

Smart shopping trolleys are designed with automatic closing mechanisms, similar to those found on self-checkout machines. We have designed the Smart Shopping Trolley for it to follow a particular person based on 'Bluetooth Pairing' Method. This basically allows the trolley to detect the RSSI strength and allot the direction accordingly.

Probable Discontinuation of Smart Shopping Trolley Technology: Alternatively, the closure of smart shopping trolleys could refer to the discontinuation of the technology altogether. This might happen due to various reasons such as lack of demand, technological limitations, or changes in market trends. If a company decides to stop producing or supporting smart shopping trolleys, it could lead to the closure of such products in the market.

V. CONSTRUCTION

This includes optimizing control algorithms and sensor parameters to ensure smooth and accurate movement while maximizing battery life and efficiency. A user interface is designed to facilitate interaction with the trolley, incorporating features such as manual control mode or emergency stop button for user convenience and safety.

The HC-05 is a versatile Bluetooth module that provides wireless communication based on the Bluetooth 2.0 protocol. It operates in a serial communication (UART) mode, making it compatible with most microcontrollers (like Arduino or ESP32).

Throughout the development process, documentation is maintained to record hardware setup, software code, circuit diagrams, and testing results. This documentation serves as a reference for future iterations and enhancements to the smart shopping trolley. A detailed presentation or report is prepared to communicate the project's objectives, methodology, implementation, and outcomes to stakeholders or potential users. Feedback from users or testers is gathered and incorporated into the project through iterative design and functionality improvements. By following this methodology, a human-following smart shopping trolley can be effectively developed and implemented to enhance the shopping experience for users.

VI. BLOCK DIAGRAM

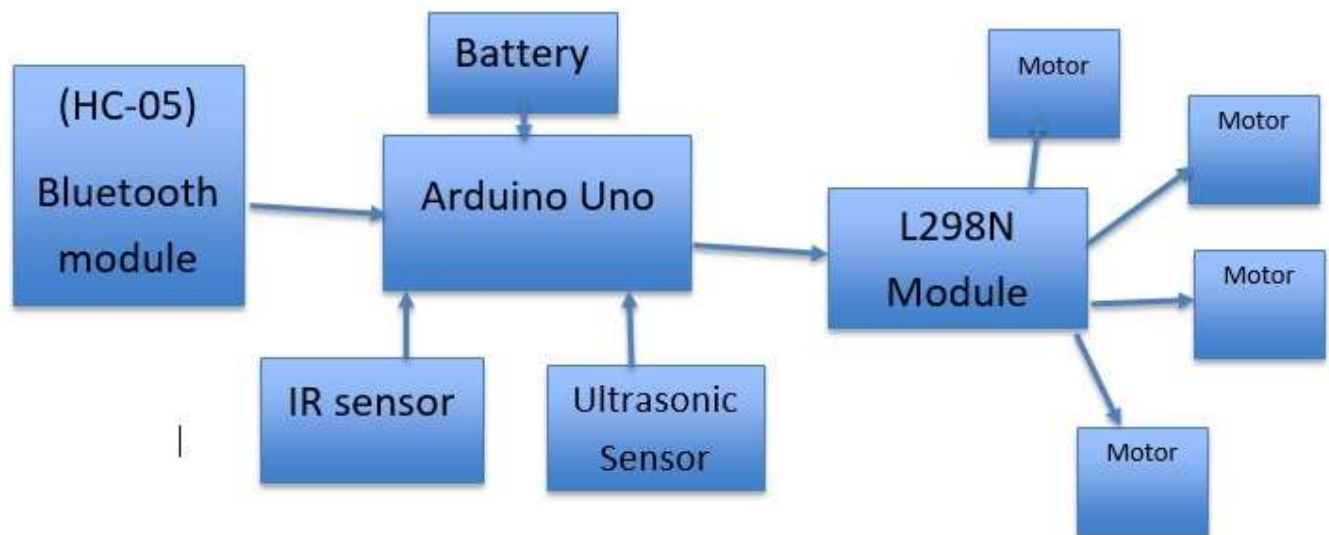


Fig 1: Block Diagram of Shopping Trolley for Shopping Mall

Fig 1 represents the shopping trolley for shopping malls which consist of HC-05 Bluetooth module, IR Sensor, Ultrasonic sensor as input components and L298N Motor driver is acting as an actuator for controlling dc motor. Here, Arduino Uno is used as a microcontroller.

VII. CIRCUIT DIAGRAM

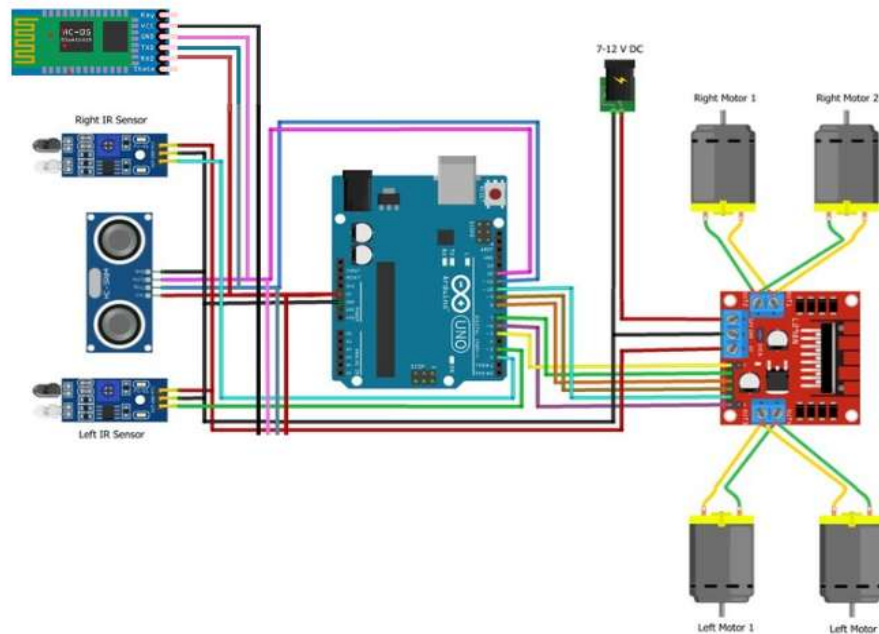


Fig 2: Circuit diagram of Smart Trolley

Fig 2 represents circuit diagram of smart Trolley. The Greenhouse Monitoring and Control System functions by using sensors to continuously monitor key environmental parameters inside the greenhouse, such as temperature, humidity, soil moisture, and light intensity. These sensors send real-time data to a microcontroller (like Arduino or Raspberry Pi), which processes the data and compares it with predefined optimal thresholds. If the temperature or humidity is outside the set range, the system automatically turns on fans, heaters, or humidifiers to restore the balance. When soil moisture levels drop below a certain point, the system activates the irrigation (sprinklers or pumps) to water the plants. If the light intensity is low, the system switches on artificial lighting.

VIII. Future Scope

The future scope of smart shopping trolleys is promising. They could integrate AI to suggest personalized shopping lists, track inventory in real-time, offer discounts based on purchasing patterns, and even navigate customers to items in-store. Plus, there's potential for environmental benefits, like reducing food waste through expiry date reminders and optimizing routes to minimize energy consumption.

IX. CONCLUSION

The smart shopping trolley for shopping malls is useful to solve the problem of existing shopping trolleys, the system reduces the need for manual intervention and solves the existing problems. This project demonstrates the use of smart technology in shopping malls for shopping purposes. The system can be easily used for real-time applications.

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