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SMART CART USING RFID

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ABSTRACT:The creation and use of a shopping cart with RFID billing and gesture control movement, specifically designed to cater to the needs of elderly shoppers. The system integrates rfid technology for automated billing and tracking of items, while also incorporating gesture control technology for intuitive and effortless movement of the cart. the proposed solution aims to provide a convenient and user-friendly shopping experience for elderly individuals, who may have difficulty navigating through a crowded store or carrying heavy shopping bags.

In addition, the smart shopping cart is implemented with features such as a large and easy-to-read display screen for displaying the total cost of items in real-time, as well as the ability to scan items and add them to the cart using a mobile app. the gesture control feature allows users to control the movement of the cart with simple hand gestures, eliminating the need for physical exertion or the use of a joystick. The system also includes safety features such as automatic braking and obstacle detection sensors to ensure the safety of both the user and other shoppers.

Overall, the proposed solution offers a promising solution to improve the shopping experience for elderly individuals by providing a more accessible, convenient, and safe shopping cart. It can also potentially benefit other individuals who may have physical disabilities or limitations. This technology has the potential to transform the retail industry by offering an innovative solution to improve the shopping experience for individuals.

KEYWORDS:Automated billing, smart shopping, RFID, gesture control, movement control.

I. INTRODUCTION

Shopping malls in big cities may see a huge rush over the weekends and on holidays. This worsens for individuals who are older. Customers frequently shop for what they need, load their carts with it and then stand in queue to pay their expenses. Because paying bills at the counters is such a challenging and process that takes time, there is typically a considerable throng there. A study commissioned by the US Department of Agriculture found that Americans typically spend 1.4 hours shopping.

Nowadays, People load their carts with a range of purchases. The cart is now extremely difficult to move and bill for. Following the completion of a purchase, one should proceed to the counter for invoicing reasons. Using a barcode reader, the cashier produces the bill, which takes time. Long line-ups can be seen at the billing counters as a result. The time and labour needed for the luggage management system will go up as a result.

Everyone often lugs their supermarket cart about with them. Customers are required to move their own carts. This method uses a substantial amount of energy. The journey also turns hectic. This issue can be resolved by employing a user-controlled gesture control system or a programmed smart cart to move the trolley. The tram can only be moved in this cunning manner. In order to address the aforementioned issue, this proposal suggests a design for a system that might be implemented in retail malls. To do this, each mall item must have an RFID tag, and each cart must have a gesture control system. When a product is added to the cart, the code is immediately recognised. The price will be added to the total bill when the item name and price have been shown on the LCD. The price for that particular item will be subtracted if we decide to remove the item from the cart.



II. RELATED WORK

MobeenShahroz, Muhammad Faheem Mushtaq, Maqsood Ahmad1, Saleem Ullah, Arif Mehmood, And Gyu Sang Choi “IoT-Based Smart Shopping Cart Using Radio Frequency Identification”, [1] 2021 outlines the development of a radio frequency identification (RFID)-based smart shopping cart utilising an Arduino microcontroller, Bluetooth module, and mobile application. The data is shared through Bluetooth from the arduino microcontroller and the mobile device with the server in cases where the mobile device is plugged into the shopping cart and the application is already installed.

T.R. Lekhaa, S. Rajeshwari, J. Aiswarya Sequeira, S. Akshayaa “Intelligent Shopping Cart Using Bolt Esp8266 Based on Internet of Things”, 2020 [2]”. IOT kit includes a barcode reader, LCD screen, and Bolt ESP8266. The general explanation of the procedure is that when a customer picks up an item and places it inside the trolley, the barcode scanner scans the item to determine its value and gain, which are then shown on the digital display screen. After the customer has finished shopping and the bill has been delivered to the counter.

Mr. Yathisha L, Abhishek A, Harshit R, Darshan Koundinaya 2015 [3] developed a model for automated shopping carts that use RFID and Zigbee modules to reduce line-ups at malls. In this system, RFID tags are used in place of bar codes; as soon as a client places an item in a cart, the RFID reader scans the item, and the item's price is shown on the LCD. The data is sent to the primary computer using a zigbee transmitter.

Jadhav Rahul, Pradeep, Nandkumar, TaraliShivkumar J 2017 [4] offered a design for an automated billing trolley using RFID. Each RFID tag in this technology contains a magnetic stripe with a unique code, and the RFID Reader module reads the tag to communicate. In shopping malls, the automated billing system based on passive RFID offers a workable replacement for the human billing approach.

Udita Gangwal, Sanchita Roy, Jyotsna Bapat 2014 [5] presented a smart shopping cart system that uses wireless sensor networks for automatic billing. The creation of a trustworthy, equitable, and reasonably priced shopping card employing wireless sensor networks is discussed in this study.

III. PROBLEM STATEMENT

In a perfect world, the busiest place to be at all times would be a supermarket. The majority of shoppers are aware that making a list, whether on paper and a pen or on a mobile device, is the first step in the shopping process. They must spend a lot of time searching around the entire store for each item individually and standing in queue to pay their bills. Older folks are badly impacted by lines and may get uncomfortable. We must continue to put old people's health and safety first while dealing with them. They have a significant danger of falling because of their frailty and brittle joints.

IV. OBJECTIVES

- The major goal is to use RFID technology to construct a smart shopping cart that will improve shopping.
- To make an effortless and smooth shopping experience for old age people by gesture control mechanism.

V. METHODOLOGY

Two parts will be used to implement the system of this project:

- RFID Billing
- Movement Control Using Gesture

RFID Billing: The PIC microcontroller's initialization for the setup of the RFID reader is the first step. The second step is the RFID Reader's tag detection of the items that have been put in the cart. The suggested system's general operation is as follows: When a consumer enters the mall, they first take a trolley. A microcontroller, LCD screen, and RFID reader are all connected to each cart. As soon as customer starts loading products into the trolley, reader starts

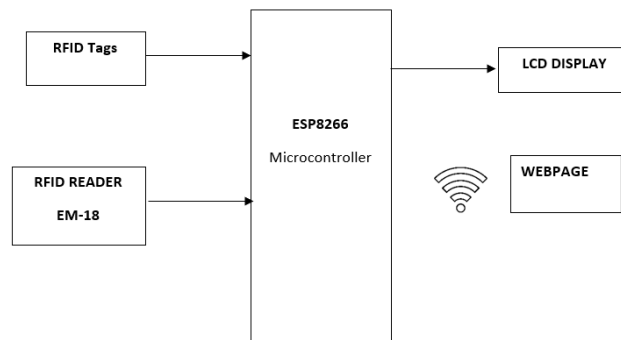


reading tags, and it sends the information to the microcontroller. Data already kept in the microcontroller is compared to the information. The user will see the product's pricing on the LCD panel if the data is accurate. If a user chooses to remove an item from the cart, the cost of that particular item will be immediately deducted from the total.

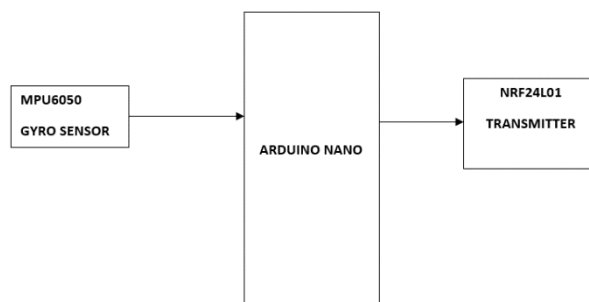
Movement Control Using Gesture: The main beneficiaries of robotic vehicles controlled by hand gestures are for disabled people and old age people, who can move the cart in the direction they want to go without having to click any buttons. This system contains a glove that the user is expected to wear while using the device. It features a receiver circuit positioned on the top and a microcontroller connected to an accelerometer. The vehicle's circuit incorporates a PIC microcontroller, FR receiver, and Driver IC to control the motors. The RF transmitter sends the commands to the RF receiver once they have been received by the IC on the circuit. Then, the RF receiver issues the command. The command is encoded and sent to the PIC microcontroller, which decodes it and moves the cart in the direction the user has requested.

VI. BLOCK DIAGRAM

RFID READING:

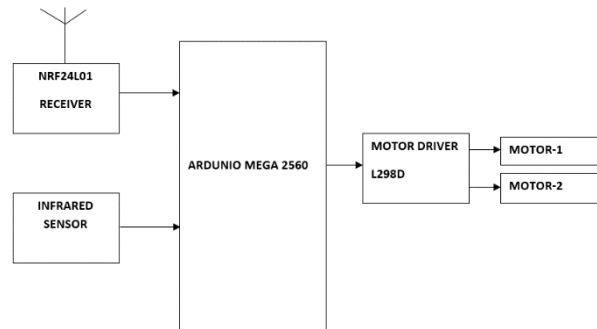


TRANSMITTER:





RECEIVER:



VII. BASIC THEORY

- A smart shopping cart is one that employs an embedded chip, an RFID, and a battery to let customers modify it themselves at the grocery store. The goal of this paper is to cut down on time spent at the checkout counter.
- The RFID system obtains the data in a machine-readable format from an appropriate transponder, which is sometimes referred to as a tag. As an alternative to barcodes, radiofrequency identification employs tiny microchips on the label to store and send specific information about the tagged object. Compared to barcodes, RFID provides benefits including the capacity to store more data.
- Emerging network technologies have altered this, allowing frameworks to be created that have all the flexibility and security required for embedded applications like monitoring RFID tags.
- A cutting-edge shopping tool created to facilitate speedy shopping is the Smart Shopping Cart. Every shopper's shopping experience will be dramatically transformed by the idea behind this intelligent shopping cart. An RFID scanner will be installed in the shopping cart, which will automatically scan each item as it is added. Ultrasonic sensors are also utilised to detect impediments and gauge their distance from one another as the movement proceeds.

VIII. IMPLEMENTATION

A smart shopping cart implementation using RFID billing and gesture control involves both hardware and software components. Here's an overview of the typical hardware and software components required for such a system:

Hardware Implementation:

Shopping Cart: A regular shopping cart equipped with additional hardware components.

RFID Reader: An RFID reader integrated into the shopping cart to scan RFID tags attached to products.

RFID Tags: Tags attached to individual products or product shelves, containing unique identification information.

Gesture Control Sensors: Gyroscope Sensor placed on the shopping cart to capture gestures made by the user.

Display Unit: A display unit mounted on the cart to provide relevant information to the user, such as item details, pricing, and total bill.

Software Implementation:

RFID Tag Detection: Software algorithms to detect and interpret the RFID tag information received by the RFID reader.

Product Identification: Identifying the products being added to or withdrawn from the cart by comparing the RFID tag that contains the information with the corresponding item in the item database.

Billing and Payment: Software module to calculate the total bill based on the identified products and their prices. It can also integrate with payment gateways for secure payment transactions.



Gesture Recognition: Software algorithms to process the gestures captured by the gesture control sensors and interpret them as user commands, such as moving forward or backward.

User Interface: A graphical user interface (GUI) displayed on the cart's display unit to provide a user-friendly interaction experience. It should show real-time updates on the cart contents, billing details, and other relevant information.

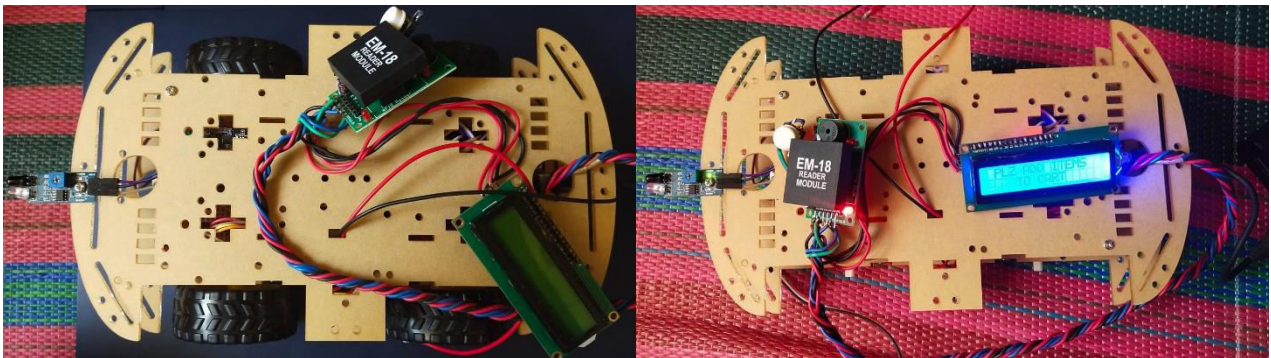
Integration:

The hardware components, such as the RFID reader, gesture control sensors, and display unit, should be connected to a microcontroller or embedded system that can communicate with the software running on it. The software components, including RFID tag detection, product identification, billing and payment, and gesture recognition, should be integrated into a cohesive system that interacts with the hardware components in real-time.

Overall, the hardware and software components work together to enable the smart shopping cart system to scan products using RFID, detect gestures for cart movement, calculate the billing amount, and provide a user-friendly interface for the shopping experience.

IX. EXPERIMENTAL RESULTS

The following technologies are achieved via gesture control, LCD Display for showing product data, & obstacle Detection are the concepts employed under this project. We have satisfied the term "Smart Trolley" by adding astonishing technologies like as automated movement, automated invoicing, and the others.



SMART CART

ITEMS	QUANTITY	COST
Biscuit	0	0
Soap	0	0
Rice(1KG)	0	0
Tea(50g)	0	0
Grand Total	0	0.00



X. CONCLUSION

We successfully implemented a billing system, and in order to use RFID to identify the goods we placed in the basket, we also input the product's information into the trolley's backend, which allows the trolley to identify the product and offer extensive information about it on the given LCD Display.

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