

# Smart Trolley With IoT Based Billing System

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**Abstract:** The Internet of Things (IoT) has revolutionized the way we interact with everyday objects by enabling them to communicate and share information with each other over the internet. The integration of RFID technology into IoT has paved the way for the development of smart trolleys that can assist shoppers in their shopping experience. In this paper, we propose an IoT-based smart trolley using RFID technology that can provide shoppers with a seamless shopping experience. The smart trolley is equipped with a range of sensors and an RFID reader that can detect RFID tags attached to products in the store. The RFID reader can read the tag and send the information to the cloud server via Wi-Fi. The proposed system can also help store owners to reduce theft by tracking the movement of the trolley within the store. The system can also detect when a shopper tries to remove a product from the trolley without paying for it. The system can sound an alarm to alert the store security personnel, who can then take appropriate action.

**Keywords:** IoT (Internet of Things), RFID (Radio-Frequency Identification), GPS (Global Positioning System).

## I. INTRODUCTION

An IoT-based smart trolley using Radio-Frequency Identification (RFID) technology is a system that uses RFID tags and readers to enable automatic identification and tracking of objects in a retail store. With this system, retailers can manage their inventory more effectively, reduce theft, and improve the overall shopping experience for their reader and a tag attached to an object. The tag contains a small integrated circuit and an antenna that transmit data to the reader when they are within range. In the context of a smart trolley, each product in the store would have an RFID tag attached to it, and the trolley itself would have an RFID reader installed. When a customer places a product in their trolley, the RFID reader detects the tag and adds the product to a list stored on the trolley's onboard computer. As the customer continues to shop, the trolley keeps track of the products in the cart and updates the list in real-time. This information can be displayed on a screen on the trolley, allowing the customer to see a running total of their purchases. One of the major benefits of using RFID technology in a smart trolley system is that it can help to reduce theft. Because the trolley is constantly tracking the products in it, the system can detect if a customer tries to leave the store with an unpaid item. The system can sound an alarm, alert security personnel, or even lock the wheels of the trolley to prevent the customer from leaving. In addition to theft prevention, an IoT-based smart trolley can help retailers manage their inventory more effectively. By tracking the products in the trolley, the system can provide real-time data on which products are being purchased and which ones are not. This information can help retailers to make better decisions about stocking their shelves and ordering new products. Finally, a smart trolley system can improve the overall shopping experience for customers. By providing a running total of their purchases, customers can keep track of how much they are spending and avoid surprises at the checkout. The system can also provide personalized recommendations based on the products the customer has already added to their trolley, making it easier for them to find products they might be interested in.

## II. EXISTING SYSTEM

In traditional retail stores, the process of shopping is manual and involves customers pushing a trolley around the store to collect items they wish to purchase. While this system is effective, it can be time-consuming, and there is always a risk of theft as it can be difficult for staff to monitor every shopper at all times. To address these issues, some stores have implemented electronic trolley systems that use barcode scanning technology. These systems allow customers to scan items as they put them in the trolley, and then pay for everything at once at the checkout. While this does speed up the shopping process and reduce the risk of theft, it still requires customers to physically scan each item, which can be cumbersome, and there is still the risk of errors in scanning. To overcome these challenges, supermarkets have implemented the use of barcodes on products, which can be scanned at the checkout counter. However, this system does not provide real-time inventory tracking, leading to stock-outs and inefficiencies in the supply chain.

## III. PROPOSED SYSTEM

The proposed system is an IoT-based smart trolley that uses RFID technology to automate the

checkout process. The smart trolley has an RFID reader that can detect the RFID tags attached to the products. The tags contain information about the product, such as its name, price, and other details. When the customer puts a product in the trolley, the RFID reader detects the tag and adds the product to the customer's virtual shopping cart. The customer can view the items in their cart on a display screen attached to the trolley. The customer can also remove items from the cart if they change their mind. When the customer has finished shopping, they can proceed to the checkout counter. The checkout counter has an RFID reader that can detect the RFID tags on the products in the customer's virtual shopping cart. The system automatically calculates the total amount of the purchase, and the customer can pay using cash, card, or any other payment method. The main advantages of this system saves time for both the customer and the retailer as there is no need to scan each product individually and automated checkout process reduces queues at the checkout counter, which means customers spend less time waiting in line.

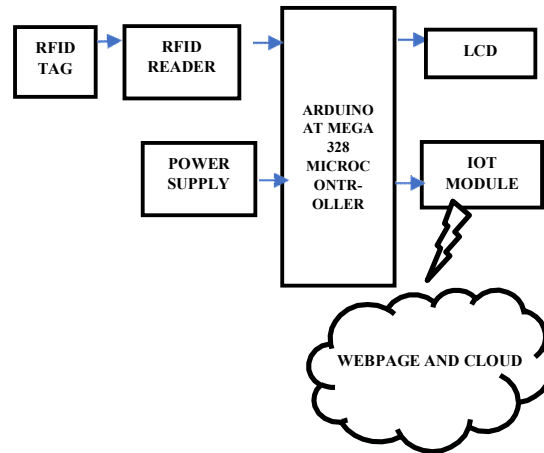


Fig.1.Block Diagram

The system ensures accuracy in billing, as the automated process eliminates human error in calculating the total cost and the system can be integrated with the store's inventory management system to keep track of the products in stock and the items sold. The system can be personalized to provide recommendations to customers based on their shopping history and preferences. Overall, the proposed IoT-based smart trolley using RFID technology offers numerous advantages over the existing manual trolley system, making the shopping experience faster, more efficient, and more convenient for customers. Arduino ATmega328p is a microcontroller that is widely used in Arduino boards. The microcontroller is based on the AVR architecture and has 32KB of flash memory, 2KB of SRAM, and 1KB of EEPROM. The ATmega328p is a low-power microcontroller, and the several built-in features such as timers, analog-to-digital converters, and serial communication interfaces. It also has 14 digital input/output pins, 6 analog input pins, and a variety of other interfaces such as I2C, SPI, and UART.

The ATmega328p is a versatile microcontroller and is commonly used in many applications, including robotics, automation, and IoT devices. It is also easy to program, and several development tools and IDEs are available to program the ATmega328p-based boards, including the Arduino IDE. The ATmega328p is a popular choice for DIY projects and makers, as it is cost-effective and can be easily integrated into various projects. Its low-power consumption, coupled with its built-in features, make it an ideal choice for battery-powered devices.

#### IV . SIMULATION

##### MODE 1 [SIMULATION DIAGRAM OF PROPOSED SYSTEM]

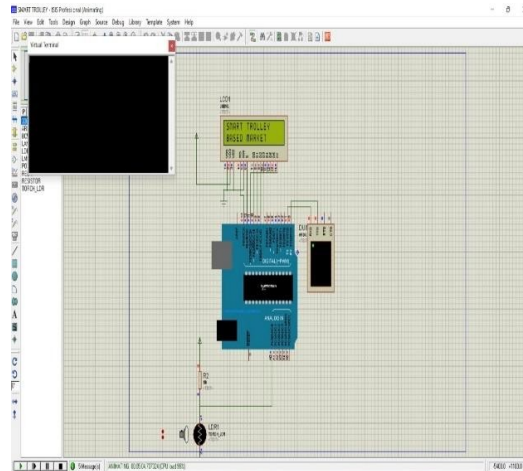


Fig.2.Simulation Diagram of Proposed System

Now run the Proteus Simulation, and if everything goes fine, to press run button and the proteus software running .We have to run the arduino by using Digital (PWM) and next we have to click the virtual terminal.



Fig.3. Hardware Implementation

A smart billing system is a system that uses advanced technology and automation to streamline and improve the billing process. It can help businesses save time and money by automating repetitive tasks and reducing errors. A smart billing system is a type of billing system that uses advanced technology and data analytics to optimize the billing process. The system is designed to be efficient, accurate, and user-friendly, providing a seamless experience for both businesses and customers.

#### V.CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. This system is used in shopping complex for purchase the products. In this system RFID cards are used as security access for product. If the product is put into the trolley means it will show the amount and also the total amount. But in this system RFID card is used for accessing the products. So, this project improves the security performance and also the speed. By means of this project we intend to simplify the billing process, make it swift & increase the security using RFID technique.

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