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Web-based Shopping Cart with RFID Technology

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A B S T R A C T

Manufacturers have been creating devices in recent years that guarantee everyone's comfort. Their ability to shop without incident is one of the traits that has evolved. Although we cannot physically feel the product's essence when purchasing online, consumers may physically feel the product and manually compare it to other brands at a physical store. Customers do not know the exact cost of their purchases until they leave a mall. Additionally, customers have no idea where a product is located. Customers must stand in a long line at the billing counter to purchase a single item. The use of new technology can be used to solve these issues. Our solution was designed primarily using web applications and RFID (Radio Frequency Identification) technology. The Raspberry Pi and RFID hardware module that detects the RFID tags on products are integrated into the shopping cart. The RFID reader connected to the Raspberry Pi scans the ID included in the tag and shows the product's information, together with its quantity, on the web app after retrieving it from a database. Any browser can be used to access the web app on mobile phones and other portable devices. Additionally, in a mall, different product categories are shown according to how they were sorted. The bill is paid using the in-app wallet. We carried out the project using RFID technology.

Keywords: RFID Technology, Shopping Cart

1. INTRODUCTION

With the advent of new technology, the automation sector is currently flourishing and helping in numerous industries. RFID stands for radio frequency identification. It features tiny electronic devices that can only carry 2,000 bytes of data and are made up of a single chip and an antenna. RFID Tags and RFID Readers are the two main categories of it. There are primarily three different sorts of tags: active tags, passive tags, and battery-assisted passive tags. A passive tag has no battery, but an active tag has one built in and regularly sends RFID signals. Only when the passive tag is powered by an external battery does it send out signals. The battery-assisted passive tag features a small built-in battery, making it only operational when in proximity to an RFID reader. Because they are affordable and don't need any complicated setup when attached to any goods, passive RFID tags were chosen to carry out this project.

The information on the RFID tags might either be a single binary bit or a vast array of bits. These RFID Tags are read with RFID readers. The use of RFID devices for object tracking, identification, and other purposes is possible. Similar to a barcode or magnetic stripe on a credit card, the RFID device serves as an object's unique identifier. Similar to how a bar code or magnetic stripe must be scanned to obtain information, an RFID device must be scanned in order to retrieve the identifying data pertaining to it. With its growing use and ability to be more cost-effective than barcodes, RFID technology has the potential to completely replace them. Barcodes cannot be read by RFID since they require Line of Sight, yet if purchased in quantity, RFID readers are just as affordable as barcode scanners.

2. A REVIEW OF THE BOOKS

In March 2016, the group A. Suganya. R., Swarnavalli. N., Vismitha. S., and Mrs. G. M. Rajathi proposed "Automated Smart trolley with Smart Billing utilizing Arduino." In this study, a system that is loaded into a cart was proposed. The Product Identification Device (PID), which includes components including an LCD, RFID Reader, and microcontroller, is what makes up the Cart. Every item in the mall has an RFID tag attached to it. When an item is placed in the trolley, the reader recognizes it and displays the product information and price, which is part of the PID, on the LCD. When the

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shopping is finished, an upload key is displayed, and when it is pressed, the subsequent bill is communicated to the PC through the Bluetooth module, where it is then generated [1].

B. In addition, we learned more about a few more initiatives, such as "A New Technology of Smart Shopping Cart Using RFID and ZIGBEE," which was put forth by Manohar Golait, Priyanka Goche, Komal Machhirke, Rupali Rathod, and Rinku Petkar in 2017. They have suggested a technique in which the cart is equipped with an RFID Reader. Given that the merchandise in the mall contain RFID tags, An item is scanned and the price is memorized when it is placed in the cart. On the LCD panel, the added products are presented. The bill is created by some RFID modules reading data from a cloud database on the web [2].

3. HOW THE SYSTEM WORKS

Nowadays, as a result of the rapid development of cutting-edge technology, consumers place a greater emphasis on digitalization and online services. The two most popular methods for helping people manage their time effectively are automation and smartphone technology. The advancement of these two technologies allows for a novel e-marketing strategy.

Two main elements of our system. One involves connecting an RFID reader to a Raspberry Pi 3 model B, while the other involves a web application that retrieves cart data for user convenience. As soon as they reach the shopping center, they should use the cart that has a 13.56MHz RFID scanner connected to a Raspberry Pi 3 model B and launch the web app on their smartphone's browser. An RFID tag with the same frequency as a reader is attached to every item in the mall. Each RFID tag has a distinct ID that is manually entered into the main database at the time of product attachment. Register and log in to the web application first. When a customer adds the first item to the basket, the first item's unique id (the Raspberry Pi and its IP address) recorded in his account in the database is compared with the product's id to retrieve the product's information concurrently. Wi-Fi is used for the two previous actions. The data includes the product's ID, description, deals that are currently available for it, and price that can be shown in the app. The information about a product and the total price due are now presented on the app as the customer adds items to their cart. The customer must tap the submit button in the app before leaving, at which point the purchase data is transferred over Wi-Fi to the billing computer for checkout. The bill is automatically generated by the billing machine and sent to the user's account for payment. The customer can now use the app wallet to pay the whole amount.

Shopping cart component

A.Every shopping cart in the mall has a hardware component that includes a Raspberry Pi and an RFID reader.

RFID reader,

B.For reading the ID from the RFID tag, we used a 13.56MHz Mifare RC522 RFID Reader unit. The RFID reader sends a radio frequency signal to the RFID tag, and the tag responds by sending the reader its ID. As a result, an RFID reader may send and receive radio frequency (RF) signals. An oscillator circuit produces the carrier frequency, and a modulator in the reader contacts the carrier signal with the data commands. The transmitter is made up of these two circuits. Demodulator acts as a receiver by gathering data. [14]15][16][17] [18].

4.METHODOLOGY

Radio frequency waves are used when an RFID reader communicates with an RFID tag. RFID tags will respond by delivering their unique ID or any additional data they have stored. When more than one tag enters the radio frequency wave range of an RFID reader (i.e., when more than one product is added to the cart), all of the tags reply to the RFID reader simultaneously. This results in the incorrect information supply and the unique id or information exchange at the RFID reader side. Tag collision is the term for this circumstance. To prevent this, we have created an anti-collision method in Python that generates an error message and isn't charged. Customer needs to re-add that item to cart.

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5..CONCLUSION

Shopping malls, super markets, grocery stores, electronic devices, etc. are some of the key areas where "RFID based Shopping Cart with Web App" is used. When there is a lot more traffic in the mall, it can be very important because it cuts down on the time needed for billing. Customers don't have to wait in a big line to pay thanks to in-app wallet. This makes purchasing convenient and prosperous. Additionally, the billing function prevents the line at check-out to give clients a better shopping experience. Future work will expand on this study for an inventory system[13] [14] 15] [16] [17] [18] .

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