

Smart Shopping with Automated Billing System Using Zigbee and RFID

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Received: 8 August 2021 / Accepted: 26 September 2021
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Abstract:

In the future, smart commerce will serve as a platform for smart cities. This method is fully automated, and billing may be completed without the assistance of a cashier. It is a mobile gadget that will be installed in the PICK and Drop basket (trolley) at department shops. Billing can be done via a swipe machine or by using their smart phones to access online banking. Instead of a bar code reader, we utilise RFID. Each item will be assigned an ID number, allowing for easy billing. In addition, the product update will be transmitted to the server. As a result, if any of the products becomes null, an alert will be sent to the main server or the master PC administrator. The bill will be sent to the customer's cellphone number through GSM. ZIGBEE is used to communicate from the trolley to the main server. We employ a PIC microcontroller in our suggested system, which is cost and performance efficient. The ultimate goal of this article is to automate billing and move India closer to being a Digital India. Time may be saved for the client, and manpower can be decreased.

Keywords — GSM, RFID, Automatic billing, ZIGBEE, PIC.

1. INTRODUCTION

We need to use the modern technological environment in a wise and effective manner now that the world is exposed to it. This study examines how smart shopping may be accomplished with the use of technological gadgets. Many of the authors have presented their smart purchasing ideas. In this article, we have offered our thoughts by referring to and evaluating their points of view, as well as highlighting them below.

Here, we're creating a smart trolley or cart that's both user-friendly and appealing to customers. RFID tags on each product and a reader on the trolley are among the components of the trolley. We create a database for each product, with a unique ID for each. The items are scanned using this tool, and the price is shown on the smartphone, as well as being useful for billing.

A distinct area is dedicated to billing in order to eliminate queues and manpower. The system that gets information from the trolley about what product is purchased and the price of the product read by the RFID is included in this part. With the aid of the ZIGBEE module, the bill will be shown at both ends—the trolley and the system—for the consumers' convenience, whether they want to continue or conclude their shopping.

The PIC microcontroller is used for programming. The procedures are outlined below.

- 1) As soon as the client enters the supermarket, he or she must provide their customer information, which includes their active cell phone number for security and optional billing purposes.
- 2) Customers can pay their bills using either their debit cards or their net banking accounts. The whole amount purchased will be sent to the server through wireless transmission (ZIGBEE).
- 3) Net banking may be performed with the aid of the GSM module, and the bill is sent to their cell phone.
- 4) With the aid of the product's unique ID number, it informs the server of the product's decrement. The shopper can replenish certain goods before they are nulled, reducing the annoyance to the customers.
- 5) When a product is added or withdrawn from the trolley, we employ some of the sensors in our suggested system. The updating is also done in a timely manner.

Queues can be avoided under this method, and time can be saved when compared to the prior system. Theft of items can be prevented by preventing the trolley from moving outside of the billing section if any of the products are not read. The message will be sent to the customer's mobile phone and e-mail address after the billing is completed. It is suggested that store owners encourage consumers to shop with the smart trolley by providing offers and discounts on items and based on the amount they spend. All of these data may be given to the consumer in one package through text message or email. Automated billing is a step forward for any

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billing system in a retail mall, and it will undoubtedly save time.

2. BLOCK DIAGRAM OF PROPOSED SYSTEM

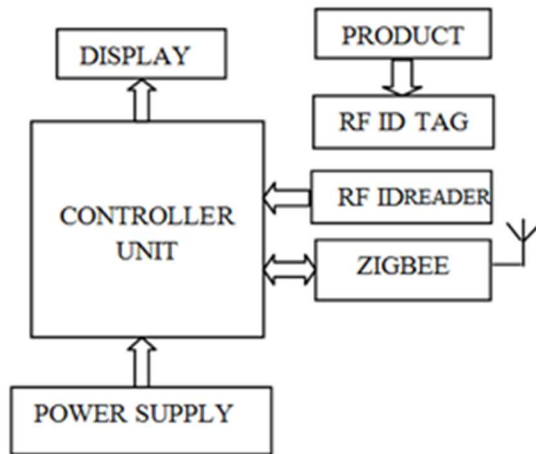


Fig 1: Trolley side

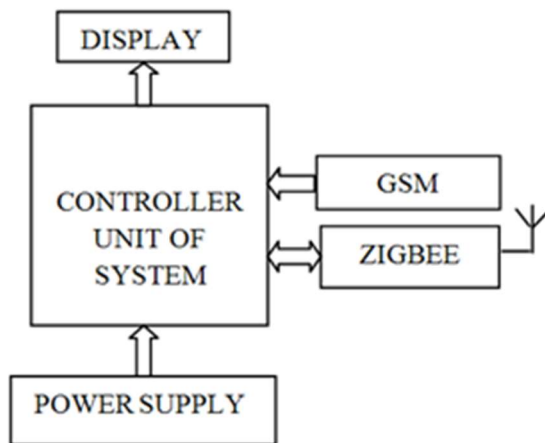


Fig 2: System side

Figure 1 shows how the trolley side of the system operates in the block design above. The RFID reader is mounted on the trolley, which reads the product tag and adds the appropriate cost. We utilise RFID instead of a bar code reader since reading takes much less time. A bar code, on the other hand, requires line of sight. Communication between the trolley and the main server is accomplished with the aid of the ZIGBEE.

The ZIGBEE is used to receive the whole bill amount delivered from the trolley in Figure 2. The bill amount is displayed on the display. We utilise a GSM module

SIM900 to send the bill amount to the customer's mobile phone, where they may also pay the bill via netbanking and receive the most latest offers for any product.

Once the ID of any product is scanned, the product is updated to the main server in our suggested system. This process will be repeated until all of the shopping is done. Once the consumer has paid their bill, the barrier will open, allowing them to leave their trolley and finish their shopping cheerfully.

RFID Tag:

Every product in our proposed system would have its own unique ID. An antenna, encapsulation, and transceiver make up an RFID tag, as we all know. RFID is divided into two types: Active RFID and Passive RFID. Active ID requires a separate energy source and travels a considerable distance, but Passive ID is less expensive, runs at a low frequency of 125Khz, and travels just a short distance. As a result, we employ Passive RFID in this case.

RFID Reader:

For functioning, the reader requires a 5v power supply. The electromagnetic impulses are transmitted to the tag via the RFID reader. The tag receives the signal and transmits the tag number. This number is provided to the main server after being interfaced with the controller.

3. WORKING MODULE OF PROPOSED SYSTEM

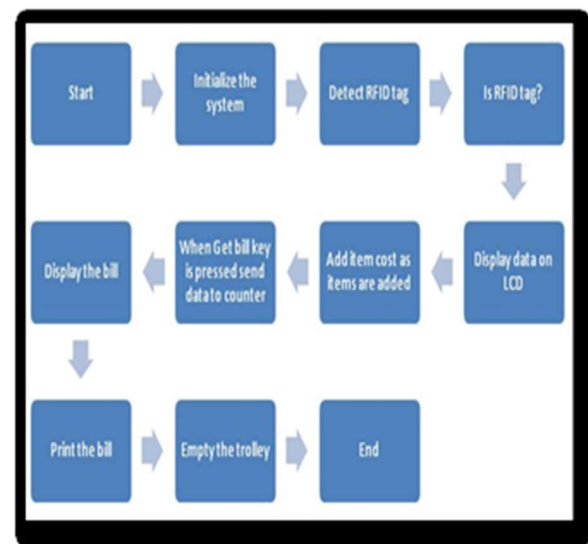


Fig3: System Architecture

The following procedure is used in the project.

The first and most important step is to set up a server or database for the shopping mall. This server houses all of the product information, including prices, discounts, and special offers for customers. When a

consumer enters a shopping centre, he must PICK up the cart in order to shop.

The power must be turned on in the gadget that is attached to the cart before the consumer may begin shopping. The consumer has the ability to manoeuvre the trolley. The power must be switched on in the device which is fitted in the trolley, after which the consumer is free to continue shopping. The consumer may now move the cart and begin shopping for items. We maintained the RFID reader inside the trolley so that when the product is placed in the cart, the reader can read the product ID. The bill will begin to build up once the product has been read. Similarly, this procedure is followed throughout the entire process of purchasing products. For example, if a client buys a Hamam soap, the product ID for the soap is 15486464. When the consumer places their items in the cart, the reader reads this number. This ID number is compared to the main server, and the procedure is carried out via the ZIGBEE.

The consumer must hit end shopping once the shopping is done, and confirmation is required. The produced bill will be submitted to the main server as soon as the confirmation is completed. The consumer must next proceed to the billing department with his cart. The consumer can use their debit card to pay their bill there. In the unlikely event that the card cannot be accessible, the bill will be delivered to the customer's cell phone, allowing him or her to pay their account using net banking. The final step is to remove all of the items from the shopping cart and exit the mall. If a bill has not been paid or if a product has not been read, it will be displayed at the entrance. The gate will be opened and the consumer will be able to depart the market if all of the processes have been performed legally.

4. APPLICATIONS

Customers will appreciate how user-friendly this smart trolley is, and it will save them time. We may also provide an extra benefit in which the client can see the identification of a certain product in a matrix style. i.e., with the aid of the led, the approximate location of the product in the trolley will be indicated.

1. In our suggested system, we will communicate through a secure wireless network.

2. In the future, sophisticated robots will be able to perform all of the shopping for you.

5. CONCLUSION

The design of our suggested system would be user-friendly for customers. This system will add to the fun of shopping. The efficiency is superior than that of any other system now in use. Both the cart and the server must be synchronised such that the output at both ends is identical, with no errors in product count or bill amount. This method is adaptable and may be utilised in a variety of settings.

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