

SMART SHOPPING TROLLEY FOR SUPERMARKETS USING RECHARGEABLE SMART CARD

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Abstract:-Nowadays, shopping has become major role in our economic activity. Basically, Innovation in technology is aimed towards making day to day life of people easier and faster. In this paper, we discuss a product "Smart shopping trolley for supermarkets using rechargeable smart card" being developed to help customer in terms of reduced time spent while shopping. The main objective of proposed system is to provide a technology oriented, easily handled, and efficient system for helping the customers in shopping. The main facility that the proposed model provides is the customer only needs to carry a smart card, which is needed to be swiped in the trolley to initiate shopping when a customer places a product in the smart trolley, the RFID Reader will read the Product ID and the information related to it will be stored in Arduino UNO. When shopping is over the customer have to press the end button which will automatically deduce the bill amount from the balance available in the smart card. The payment is made right there and thus avoiding the need of waiting in queue at counter and saving large amount of time. The smart card is rechargeable.

Keywords :- Arduino UNO, Radio Frequency Identification tags, RFID Reader, GSM Module, LCD Display.

Introduction

Recent advancements in technology and communication have caused revolution in all fields. In this new era we need to implement smart technology by bringing about automation in system. Challenge is not to develop such system instead to handle the problems aroused due to automation like energy consumption, cost, efficiency etc.

Problems faced in present shopping system

- a) Long queues for billing
- b) Large manpower needed
- c) Demonetisation.

The objective of our proposed system is to overcome the problem faced in the conventional shopping method. In this project we make use of RFID tags attached to the products in which the detail about the product is encoded. RFID tags are simply called as advanced barcode. It is a small transponder which transmits an serial number to a reader. RFID is the special type wireless card which has inbuilt embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit card number. RFID reader is the circuit which generates 125KHZ magnetic signal. This magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read the RFID card number. In this project RFID card is used as security access card. So each product has the

individual RFID card which represents the product name. RFID reader is interfaced with microcontroller. Here the microcontroller is the flash type reprogrammable microcontroller in which we have already programmed card number. The microcontroller is interfaced with keypad. This paper presents the use of smartcard along with RFID card which will facilitate the billing on trolley itself and thereby making system even faster. In this system every customer will be provided with smartcard which will be pre-recharged with certain amount. Once the entire shopping is done user will be asked for payment mode wherein there will be two modes,

- a) Smartcard payment
- b) Cash payment

The proposed system has following important modules:

1. LCD interface for displaying shopping and billing details
2. RFID tags for project identification
3. Transceiver for achieving wireless communication with server

In this paper we discuss in detail system design, working, testing and conclusions. In conclusions we discuss about advantages and disadvantages and future scope of proposed system. The Smart Shopping Cart has the potential to make the shopping experience more pleasurable and efficient for the shopper and the inventory control easier for the store management.

Related Work

As we studied the idea behind smart shopping trolley we found that to overcome the problems of long queues earlier barcode were used which had their limitations. First is line of sight interaction with product but it could not help to reduce long queues. Later on barcodes were replaced by RFID whereby billing is

done at trolley itself. RFID's were successful to some extent to solve the problems. But although billing is done at trolley customer is supposed to pay the bill at counter which certainly takes time Also there was No facility to delete the products before billing. So idea was to overcome the queues at counter completely and provide function to delete the products if needed.

Proposed Model

We came up with the idea of using Smart card along with RFID. Every customer is provided with Smart card which has certain amount in its balance. Once billing is done at trolley smart card is swiped to make payment it thus completely eliminates queues at counter.

A. Algorithm

Each trolley is associated with a RFID reader and a smart card reader. When shoppers with the cart press "start button" the system turns ON and then all the components such as RFID reader, microcontroller and physical media start working. Every product has an RFID tag which contains unique id. These Ids are fed in the database assigned to the corresponding products.

The functioning of the system is explained below:

Step 1: Start the system

Step 2: Swipe the user smart card to initiate shopping. The user information and the available balance are displayed in the LCD display.

Step 3: Place products in the trolley.

Step 4: Display information on LCD.

Step 5: Update the billing Information.

Step 6: Product that are not needed can be taken out from the trolley.

Step 7: Subtract the price of product and update the detail on LCD.

Step 8: Press the finish button to end shopping.

Step 9: The bill amount will be deduced from the available balance in the smart card.

Step 10: Display information on LCD.
 Step 11: End

B. System Flow

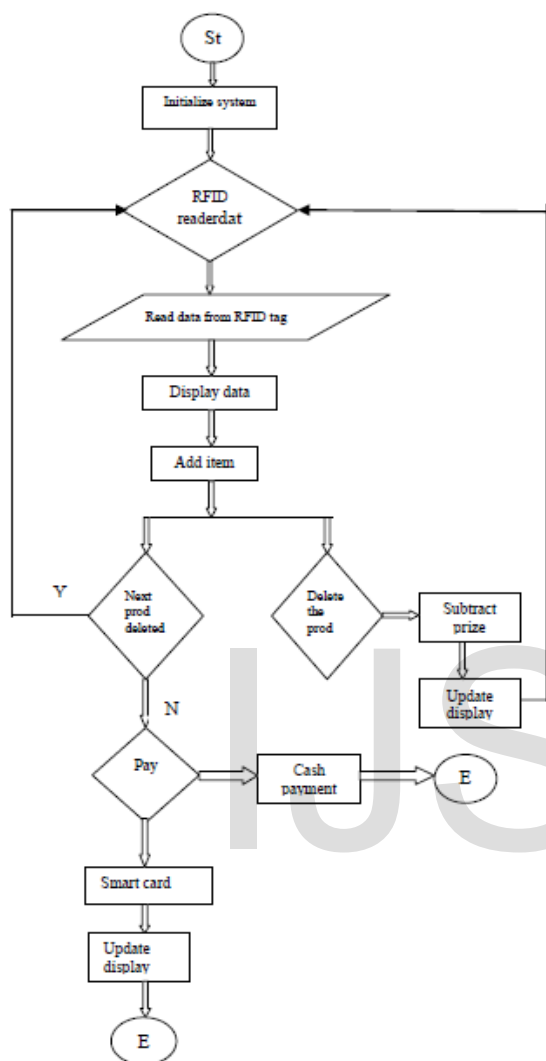


Fig 1.Flow Chart for Smart Shopping Trolley

C. Block Diagram

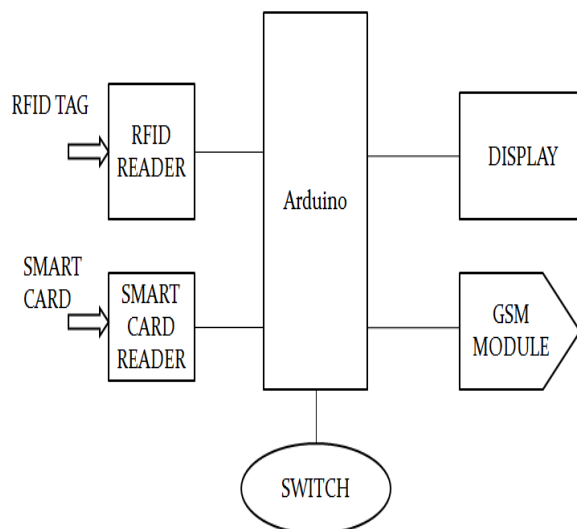


Fig 2. Block Diagram for Smart Shopping Trolley

Working

Shopping trolley is equipped with proposed model, with RFID reader on front panel. An RFID tag is attached to each product in shopping centre. After selecting a product, person has to drop the product in trolley. When the product is dropped the RFID reader scans the RFID tag on product without requirement of line of sight communication. RFID reader sends information of each scanned product to microcontroller. Price and product name is displayed on LCD on the trolley. When a person is done with the shopping, he has to press a switch. The model then asks for the entry of smart card. When user swipes the smart card in the provided slot, the total amount is displayed on LCD, and deducted from balance available in the smart card. Further this information regarding price and name of each product is transferred to the central PC. If user wants to delete some item from trolley another switch is provided, with the help of which amount of deleted items can be deducted from the total bill.

System Working

When the customer enters the shopping mall, he/she will receive a trolley on which there will be a RFID Reader, LCD Display and Android device. The trolley will start its processing once the vendor presses the "START" button on the trolley which will be only seen by the vendor. Thus, now the customer can use the smart trolley for shopping. Whenever the customer places a product into the trolley, the RFID Reader will read the tag information and display the related results on the LCD Display. These steps are repeated till the customer finishes his shopping and the "STOP" button are pressed by the vendor. Once the "STOP" button is pressed there is an option provided to end the shopping with the same purchased products or to delete or remove some of the products from the trolley. This totally depends on the customer choice. At the end of shopping, the customer can straight away pay the bill and leave the shopping centre. Inventory status of the products is also updated at the end of shopping.

Conclusion

The smart shopping trolley application creates an automated central billing system (ACBS) for supermarkets and malls. Using PID (product identification), customers will not have to wait near cash counters for their bill payment. Since their purchased product information is transferred to central billing system. Customers can pay their bill through credit/debit cards as well. The system proposed is highly dependable, authentic, trustworthy and time-effective. There will be reduction in salary amount given to employees, reduction in theft. Also, the system is very time-efficient.

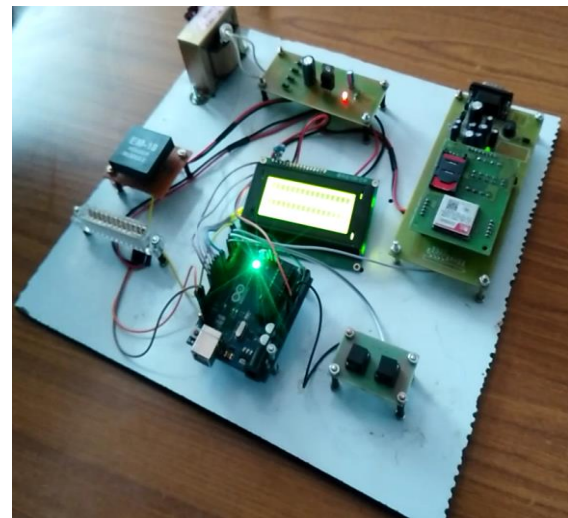


Fig 3. Hardware Setup

Future Scope

The proposed smart shopping trolley system intends to assist shopping in-person which will minimize the considerable amount of time spent in shopping as well as to time required in locating the desired product with ease. The customer just needs to type the name of the product he wants to search on the android device, and the cart will automatically guide him/her to the product/s locations.

Literature Survey

Dr. Suryaprasad J in "A Novel Low-Cost Intelligent Shopping Cart" [1] proposed to develop a low-cost intelligent shopping aid that assists the customer to search and select products and inform the customer on any special deals available on the products as they move around in the shopping complex. Amine Karmouche in "Aisle-level Scanning for Pervasive RFID-based Shopping Applications" [2] proposed to develop a system that is able to scan dynamic and static products in the shopping space using RFID Reader antennas. Instead of conducting the RFID observations at the level of individual carts, aisle-level scanning is performed.

Satish Kamble in "Developing a Multitasking Shopping Trolley Based on RFID Technology" [4] proposed to develop a product to assist a person in everyday shopping in terms of reduced time spent while purchasing. The main aim of proposed system is to provide a technology oriented, low-cost, easily scalable, and rugged system for assisting shopping in person.

Mr. P. Chandrasekar in "Smart Shopping Cart with Automatic billing System through RFID and ZigBee" [5] proposed to develop a shopping cart with a Product Identification Device (PID) which will contain a microcontroller, a LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID reader on shopping cart, meanwhile

product information will be stored into EEPROM attached to it and this EEPROM data will be send to Central Billing System through ZigBee module. The central billing system gets the cart information and EEPROM data, it access the product database and calculates the total amount of purchasing for that particular cart.

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