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Person Following Shopping Cart Robot

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Abstract: ***World is developing with technology and busy. Society searches the ways to reduce the busy situations in daily life. Shopping at big malls is one of the busy situation in daily life. This paper presents a system, "Person following shopping cart robot" to reduce the rush and manpower at big malls. The system has four ways to help us in the customer's point of view i.e.,(1)instant billing details of purchased products (2)contact with customer care centre (3)communication with billing counter (4)customer following shopping cart. System can be placed on a trolley that can help the customer throughout the shopping. The system works on the basis of Radio frequency identification which provides a new satisfaction. Way to increase the customer***

Keywords: RFID, AVR microcontroller, ZIGBEE, MAX232, L293D

1. Introduction

Today world is developing in accordance with the technological growth. As a result haste and lack of time has affected everyone's life. Such a situation in daily life is the shopping or purchasing of products from big malls. "Person following shopping cart robot", as the name indicates this system helps us in purchasing items like a robot. This system can be placed on a trolley and it is based on RFID technology and the main module is AVR microcontroller. System helps the customer to purchase the products with updated bill details, contacting the customer care centre, gives a warning when reaches the money limit, communication with the billing counter and automatically follows the customer.

1.1 Features

A. Billing
When a product is purchased and put it into the trolley, then the system adds the bill and when a product is taken from the trolley, it subtracts the cost of that product from the current bill. Finally, an updated bill will be display on the LCD

B. Money limit & Warning alarm
Customer can set the money limit at the beginning of the purchasing. When it reaches the money limit, the system will give a warning alarm to stop the purchase.

C. Transfer of bill details
When the customer presses the end shopping button when done with purchasing, updated bill details are sent to the billing counter.

D. Contact with customer care centre
The system will help the customers to connect with the customer care centre for any immediate help during the shopping through messages with the help of LCD and keypad.

E. Automatic movement of the trolley
As the name implies, the system is placed on the trolley which moves along with the customer with the help of the dc motor.

2. Block Diagram

Figure 1: Diagram for billing unit\customer care centre

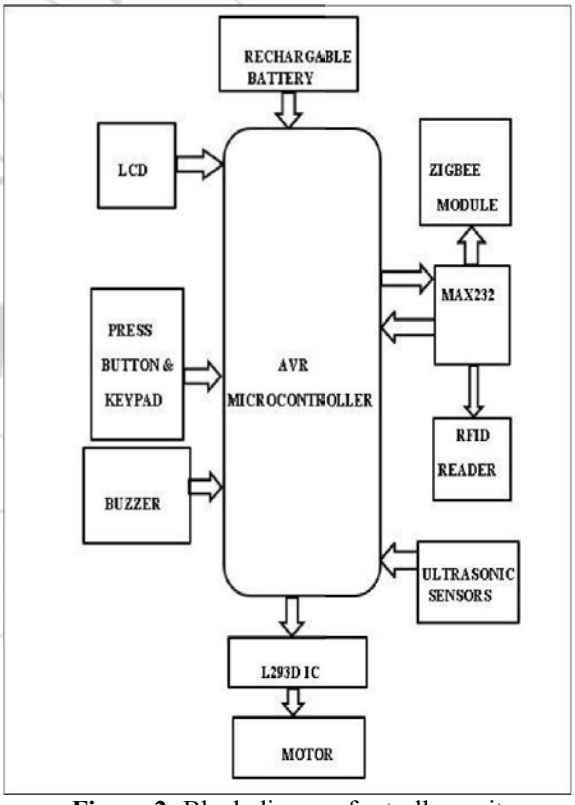

Figure 2: Block diagram for trolley unit

3. Design of Hardware

a) Rechargeable Battery
The system works with the help of a rechargeable battery and can be charged when the system is not in use.

b) Microcontroller
AVR microcontroller is used as the main processing unit. When a product is put into the trolley, RFID reader identifies the details of the product and gives a signal to

the microcontroller which processes the data and the details are given to the LCD display.

c) RFID Reader

RFID is an automatic identification method in which it reads the data from the tag placed on the products. When a product is placed on the trolley or removed from the trolley, system can update the bill details with the help of the RFID technology.

d) MAX232

MAX232 is a voltage level converter IC which converts signals from RS232 serial port to signals suitable for use in TTL compatible digital logic circuits.

e) ZIGBEE module

ZIGBEE is a personal area network which facilitates the data communication between the trolley unit and the server computer placed in billing counter and between the trolley unit and the customer care centre thereby the customer can connect the customer care centre for services that helps in the purchasing.

f) Ultrasonic Sensors

The system consists of three sensors for locating the customer which enables it to follow the customer. Ultrasonic sensors are used for this purpose and this module includes ultrasonic transmitters, receivers and control unit.

g) Dc Motor & Dc Motor Driver

Here motors are used to follow the customer as per the requirement provided in the software. L293D, dc motor driver IC which is used to drive the motor and two dc motors can be interfaced and controlled in both clockwise and counter clockwise direction.

h) Press Button &Keypad

Here, a 4*4 matrix keypad is used for setting the money limit for shopping and the customer can type the message as per needs to the customer care centre. The End shopping button in the system is used for getting the final bill and an emergency button for connecting the customer care centre.

i) Buzzer & PC

Buzzer gives the warning bell when the amount reaches the money limit. Here, two computers are used, one is in the billing counter for checking the bill details of a customer and other is placed on the customer care centre for replying the messages from the customer during the time of purchasing.

j) LCD

Here we use 16*2 alphanumeric LCD display for displaying the bill details such as the updated bill, product name, cost, quantity and the messages from the customer care centre.

4. Working

The working of the person following shopping cart robot (PFSR) is as follows:

The customer takes the trolley for purchasing. A RFID module is attached to each trolley. Also, each trolley has a distinct smart card. When the card is swiped on the RFID module the trolley becomes ready for moving. For exact identification of the customer, he should keep the card throughout the purchase. Here the trolley moves with the help of ultrasonic sensor.

Then the customer can set the money limit with the help of keypad. For example, if the limit is set at Rs.2000, then when the amount of purchase reaches Rs.2000 the system alerts the customer through a warning alarm.

When the customer picks up a product and inserts it into the trolley, the RF reader on the system scans the RF tag on the product. When a product is dropped into or removed from the trolley then the RF reader identifies the product and sends the data to the microcontroller. The microcontroller processes it and updates the bill. This data is then fed to the LCD screen which displays the price of the product, quantity and the total amount.

The system also facilities the customers to contact with the customer care centre during the shopping. For example if the customer wants to know the row or block in which a particular product is kept, he can contact the customer care centre through message, then the centre replies with the information. In this way the shopping trolley follows the customer throughout the shopping.

The customer can stop the shopping by pressing an end shopping button on the trolley. By pressing the same button again the final bill details are passed to the billing counter with the help of Zigbee.

Figure 3: Flowchart for PFSR

The PFSR offers the following advantages are:

a) Reduces manpower, i.e., no need of pushing the trolley.
b) Updated final bill with no confusions.
c) Time saving.
d) Increases customer satisfaction.
e) Clear product details.
f) Contact with customer care centre at any time.

5. Conclusion

Person following shopping cart system offers a good shopping experience to the customers. It alsosaves time and is very helpful in reducing rush in shopping malls. The system also facilitates easy and friendly handling of shopping trolley without pulling them during shopping thus giving a total customer satisfaction.

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