SMART TROLLEY BILLING SYSTEM

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Abstract

Now a days, shopping has becoming a daily activity in today's world. We can see large queues in many shopping malls waiting for billing. The objective of our project is to overcome the problem of standing in queue and wasting time. To overcome the above problem, we are proposing a smart trolley billing system that will audit the purchased products and the payment is made online automatically using the RFID tag. It will automatically identify and scan the product,and the final billing is made from the cart itself .Sothat customers are free from waiting in a long queue at checkout. It also provides the centralized and automated billing system using RFID. This model is reasonable and profitable smart shopping cart handled by the IOT innovations. The primary goal is to provide a technology oriented, time saving and commercial oriented system for enhanced shopping experience. This system will also provide suggestions for the products based on user purchased history from a consolidate system. In this system, every product in mart will have RFID tag, and every cart will be having RFID Reader attached to it. These features will save time and make shopping easier. Overall we can gain the best shopping experience.

Keywords: RFID reader; Arduino ; IOT ;Smart trolley; Shopping smart; Ultrasonic Sensor.

1. Introduction

We are in the world of Internet of things (IOT), and here all interactions between physical objects have become a real. This has created a new revolution in all our systems. This created many dispute in data management, wireless communication and real-time decision making. Initially we

used to generate bill in the paper format and then later we use the technology. The barcode scanner was used to read and scan the barcodes. But later, we focused on the smart trolley billing system using RFID tag which is a digital storage device that is used for identification and the information recording. A reader can access or read the data into the RFID tags through the electromagnetic induction. A user can only use the RFID tag without the power consumption. When the customer purchased the product, he/she firsts scan the RFID tag of the product using the RFID reader and put into the trolley. While purchasing the products customer needs to scan the RFID tag of the product, a price of the product is taken and stored in the system's memory. When a person goes for shopping in any mall then he/she takes trolley and after completed the shopping he/she has go to the counter for billing. Billing is done with barcodes which is very time consuming process. In this technology, we require scanning each and every item based barcode labels attached to that item. It has to done by man power since we need to scan each label manually. And another disadvantage is that barcode cannot read from long distance. So, our aim is to design automatic billing system which based on Radio Frequency Identification.

2. Literature Survey

A. Smart Shopping Cart

In this [1] paper they have made a system model which supports easy shopping. This model is attached to the trolley for easy viewing. It consists of RFID reader which is used to scan each product which has the RFID tag in it. The billing is done in smart trolley itself. The product name and its price will get displayed on LCD screen.

B. RFID Based shopping Trolley for Supermarket

In this [2] paper it consists of RFID and Arduino. Here the number of product and the product weight will be displayed,

along with the price details. If it does not match with the database then buzzer will beep

C. Smart Cart using Arduino

Another model [3] consists of RFID, IR sensor, ultrasonic sensor. The reader reads the tag in the product and the corresponding amount is transferred to the billing desk. They can get the hardcopy of bill from the desk after payment.

D. Smart Cart with Automatic Billing

In this [4] the author innovate a system which supports smart billing trolley. In that they are representing the system with the additional functionality, which will calculate and update the customer bill. The product and the price will be displayed in the LCD screen. They can directly go the billing desk and pay the amount.

E. Smart trolleys for Shopping Malls

Now-a-days number of large as well as small shopping malls [5] has increased throughout the global due to the increasing public demand and spending. Constant enhancement is required in the traditional billing system so as to improve the quality of shopping. To improve the existing system this shopping cart will generate the shopping bill on cart itself with the help of RFID reader. This system will save the time of customers and workload of employees in the mall.

F. Smart cart using automatic billing, product information, product recommendation using RFID

At the billing desk, the bill which is displayed on the screen will be transferred to the systems memory. This is possible by the module which is present inside the RFID, which transfers the bill wirelessly.The disadvantages of this system model is that once after displaying the total number of products and price,we have to enter a key.And after that no addition or deletion of product will happen.

G. Smart shopping cart with automatic billing system through RFID and transmitter and receiver

In [7] malls, there can be a big rush on holidays, weekends especially during on special offers and discount. Due to purchasing in the shopping mall, now-a- days customer prefer the online shopping to get the required items like Amazon, Flipkart and Snapdeal etc. so to solve this problem this paper proposed the virtual cart, using which one can overcome the complications of online and offline shopping by ensuring a better experience.

3. Existing System

In the existing system, they have used the traditional method of barcode scanning. Using the Fig [3.1] barcode scanner we need to scan each product and so this method becomes very slow to be scanned. A barcode reader is associate in electronic device for reading with the barcodes. In this process we have no automatic billing system and the customer has wait for the billing process in the long queues. Therefore, using the barcode process billing method is slow. This eventually results in the long queues. To avoid the process, we introduced types of technology is the RFID based billing system. User can pay the amount through credit/debit cards or by cash. But it is the time consumption process for the billing purpose. So, the waiting time to pay the bill is increased. To overcome, the time consumption process the RFID based smart trolley system is proposed.

Fig. 3.1 Barcode Scanner

While the customer keeps the product in the smart trolley, the Radio frequency ID reader automatically senses the product by scanning the tag. And its corresponding electronic product code number is generated automatically. To store the item price and total billing data, microcontroller memory is used LCD display. This electronic product code provides the information of the product its name and price.

4. Proposed System

In the proposed system, once the customer purchased the product, they have to first Fig [4.2] scan the RF tag using the RFID reader and then place it in the trolley. When the customer scanning the RF tag of the product, a price of the product is taken and stored in the systems memory.If matches are found then the cost and the product name gets displayed on the Fig [4.3] LCD. At the same time the processor sends the same information to computer for billing purpose with the help of RS232 protocol. In this proposed system we are also using the IR senor for counting the product for security purpose. This will not have any addition of cost product in bill. If any unwanted product is removed from the trolley, then it will reduce the count in the bill and recalculate the amount based on that. Through the RFID tag, the scanning purpose will be done in less time and there is no need of human labours. The name and price of the product will be displayed on the LCD of the smart trolley by the controller.

Fig. 4.1 Smart trolley

Fig. 4.2 RFID Tag

Fig. 4.3 LCD Screen

5. System Architecture

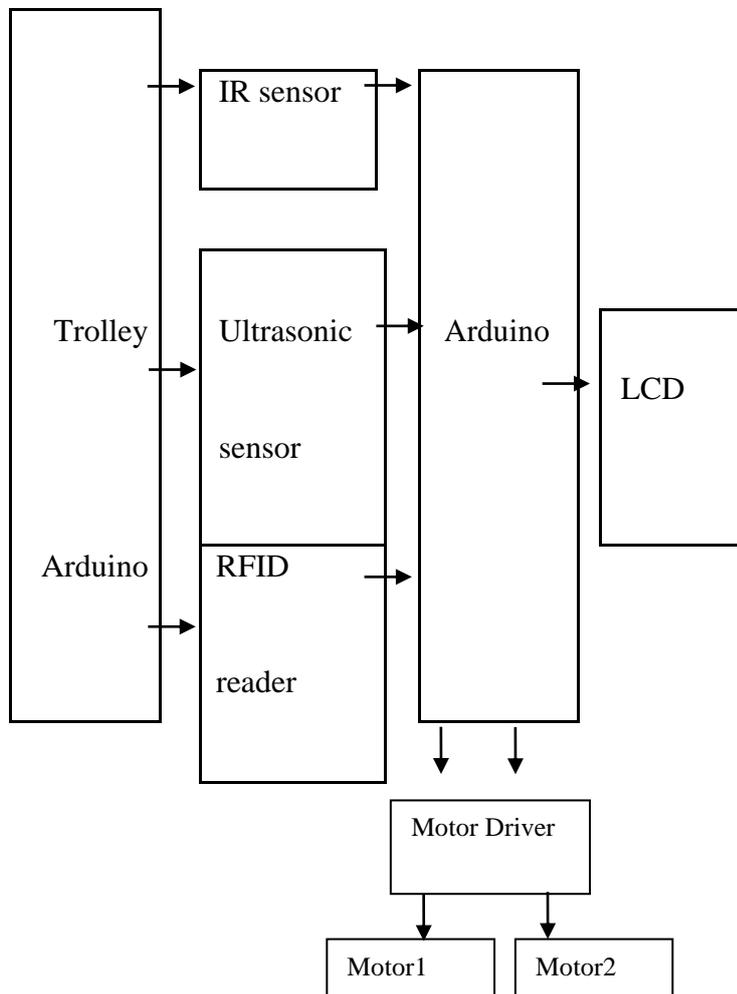The working steps for the smart trolley billing system:

Fig. 5.1 System architecture

Initially the trolley will be placed and the customer as to take the product and put it into the trolley. In the trolley, the ultrasonic sensor and IR sensor will be fixed. So, it can be sensed and measured the distance of the object. When the user

keeps the product in the trolley it has been read by the RFID reader. Every product has an RFID tag which contains a unique id. Through the RFID reader, the product will be automatically scanned. The details of the product will be displayed on the LCD screen by scanning. It has an RF module that acts as a transmitter and receiver of radio frequency signal. These tags will automatically identify and transmit the information. This tag will be placed inside the trolley, and then the product will be calculated one after another. IR sensor is used to calculate the total count and product of the item. After completing of the purchase, the customer will press the button and the total bill can be paid at the cashier side.

Finally, the cost of each product will be displayed as a bill in the LCD display. In the LCD display, the product rate will alone be displayed and for the total count of the product sensed

by IR sensor. These steps are repeated until the end of the shopping button is pressed. After shopping, the customer can straight away to pay the bill according to the displayed bill in LCD and leave.

6. Pseudo code

Step1: Start

Step2: Initialize the system

Step3: Search for RFID

Step4: Scan/Read RFID tag

Step5: Read the related details from memory

Step6: Display data on LCD

Step7: Add item cost as items are added

Step8: After shopping, press the upload key

Step9: Bill is printed

Step10: Stop

7. Project Simulation

The RFID card reader reads the product details and displayed on the LCD. These details about the product name ,quanity amd amount will be stored in the local memory of the system.

When finished shopping all these contents were read and billing can be done. The product information will be then sent back to server to update the central memory.

a. Scan the items and indentify items based on RFID tags and sync with the central database.
b. Billing gets automated.
c. Shows the name and the price of the items.
d. Update the system with each purchase of a product.
e. Complete view of the list of products with its price on LCD display.

All the possible test cases are tested. No special training required for using this user friendly smart trolley billing system.

7. Results

The proposed model is easy accessible and convenient to use. It does not require special training. The manpower is decreased and will save time that the user spends in billing queue. Many users can be attended in same time which is useful for retailers and customers. Time efficiency and cost efficiency are guaranteed by this smart billing system.

8. Conclusion

In this paper, we successfully implemented the RFID tags for the smart trolley billing system. Even though we have some challenges with smart shopping ie, sometimes items cannot be detected because of its tag orientation, size and shape. Technologies that support the interactions between physical products are relatively costly. These are the drawbacks addressed which have been overcome in this application. This smart trolley is cost effective and the automated billing amount will be displayed on LCD.

In the Future Enhancement, we can add the indoor navigation system which can locate the required product from the customer place of location. Here we have used a very low range RFID reader, which can be further enhanced with a high range reader when it comes for real enactment of this prototype. Although many new developments have been made in this area, supporting such application is still a major challenge.

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