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Article Title: **Smart Shopping Trolley Based On RFID**

Smart Shopping Trolley Based on RFID

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ABSTRACT

To overcome the drawbacks a novel system has been proposed to reduce queue in the departmental stores and also to help the customer to find the product. Project work aim to assist the customer by not only reducing the queue in billing but also in the payment area by providing payment options in cart using card. Each product will have a passive radio frequency ID tag which represents the unique electronic product code. Thus, the electronic product the information about the product details (i.e.) name and price

Keywords: Arduino, RFID Reader, RFID Tags, Buzzer, Touch Sensor,Buzzer

I Introduction

RFID is an upgrading innovation which has as of late pulled in light of a legitimate concern for the exploration group in view of the more advantages it offers over the other existing recognizable proof and information detecting improvements. RFID is the abbreviated form thus it uses a radio wave for naturally distinguishing the things. RFID is a technology that permits the exchange of information amongst the tag that has a specific labels and the reader. It transfers the information by contactless without the need of viewable pathway over a separation up to a couple of 10 meters relying upon the sort of label engaged. For this framework the radio waves transfer the information and the distinct tags can be scrutinized or collected normally. This part is designed to survey the current technology writing and probe the problems in the existing RFID organization starting from the transformation to yet in its recognition phase.

From past the growth of this technology from 1900's, aside to this expressed reliable perspectives, thus innovations have some new affairs or points. Thus a planned motivation behind part for lookat the writing identified with the abovementioned technology additionally develops scholarly analysis with giving an deal into a segment of the outstanding and precious notes where in cases hindering the growth of this alteration. It basically works on the goal to produce a more prominentperceivability and reliability and an enhanced item speed of the RFID innovation. From past 1900's, the evolution of this innovation aside the expressed affirmative viewpoints, thus the existing system has some problems by using the RFID technology. And the anticipated rationale isa part where the writing is related to Radio frequency Identification and further develops scholasticresearch, and giving a knowledge into a portion of

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pp. 173-181

Article Title: Smart Shopping Trolley Based On RFID

the exceptional information's and urgent issuescan block the development of RFID technology. The merchandising process is the major part of the supply chain management that promotes the products to the consumers and distributors. Shopping is the only thing where all people used to dothis thing. There are some supermarkets or shopping malls where it sells the retailers product andit creates a relationship between the consumer and the consumers purchase. Instead of online shopping people are used to the supermarkets with family or friends to entertain, enjoy and get thequality product with traditional shopping. In current age the supermarkets and malls should reinvent so that in critical situations it can be managed .Shopping malls or supermarkets are the place where small business retailer meets their need to sell their product to the consumer and thuswhere supermarkets acts as a medium for small group organization. In recent times many people not want to waste their time in the traditional shopping and thus it should be reinvented. In the today's world many of the supermarkets use barcode technology for billing the items. The barcodeis nothing but a black vertical strips where the data are stored in terms of barcode technology. Thuswe implement smart trolley where the barcode is scanned with the help of the reader we attachedto it. Whereas in smart trolley the product can be scanned by the user self-scan by using ultrasonictransducer. RFID system can be used for the contactless information transfer thus it is used in oursystem.

When we refer to RFID technology then we should consider with the reader and the tags which has specific labels. This system uses Arduino microcontroller where it access the input data and itresponds with the corresponding output. The innovation must be simple and it should be environmental friendly so that it can be understood by the people. In the recent time due to the pandemic, social distancing is the mantra where we used in every space where we go and thus in the super market it is the main disadvantage that people does not follow social distancing. The sensor ultrasonic transducer is implanted in the smart trolly and it helps to maintain social distancing in between people.

2 Existing Project

The existing system has RFID tags to read the product details and LCD is used to display the details of the product. The existing system is capable of doing automatic billing and for such system zigbee is used to store the billing information and later the information is retrieved by cashier by using the zigbee or physical cable[1].In some other models they have tried to increase the range by using UHF RFID and Circular Polarised Antenna[2].In some models they have used web camera to monitor the customers to prevent theft[3]. In [4] they have used a server on each product shelves to find in which product customeris interested and also it senses the customer behaviour and assist them with the help by sending information to the store's employee, it mainly focus on analysing customers. In [5] the product details were red by using RFID and arduino is used as as a micro controller. A Bluetooth module is used to transfer the product information to mobile phone and also to transfer the bill informationto the cashier by connecting the mobile phone with the shop's server. Figure 1 depicts the block diagram of the

ISSN (Online): 2583-7052

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pp. 173-181

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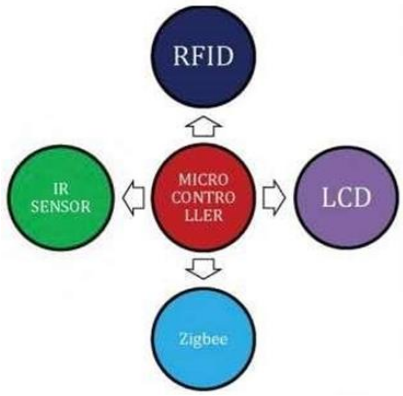
existing shopping cart.

The drawback of this system when two customer are standing near the trolley, there is a chance that the trolley may get interchanged for another customer. It is not. The block diagram of the proposed shopping cart is shown in Fig 2 The main thing which frustrates a customer while shopping is searching for the products they need, they may search it in the whole shop and they left out not getting it even if the product is available they need to spend time to find it so we are thinking to give assist to customer in this area by providing the product details and the are they are located in the store. The project work aim to assist the customer by not only reducing the queuein billing but also in the payment area by providing payment options in cart using card where balance amount is stored in arduino EEPROM and retrieved and also another option through mobile app.



2.1 Existing Block Diagram

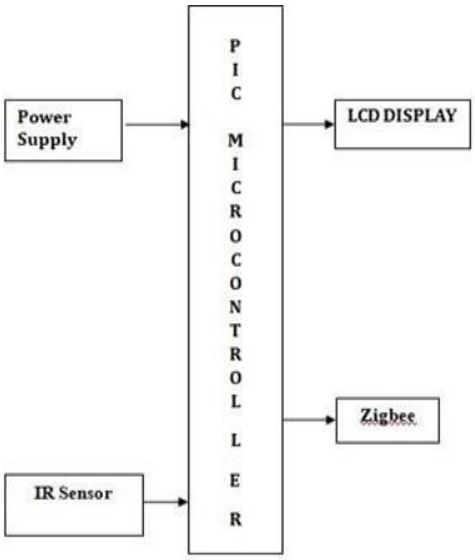


Figure 1: *Block diagram of existing system*

3 Proposed Work Explanation

In the recent systems, the bar codes are printed in the product thus these bar codes are usedfor

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pp. 173-181

Article Title: Smart Shopping Trolley Based On RFID

scanning so they don ’t want waste their time in queue for paying the amount. At times in the billing counter the bar code of some product can be damaged thus it too take long time for scanningmanually. In order to solve the problems identified and to save the customers time and to win theloyalty with the clients by the retailers. In the proposed system each product will have a passive radio frequency ID tag which represents the unique electronic product code. Thus the electronic product code gives the information about the product details (i.e) name and price. When the customer puts the product in the shopping cart, the RFID scanner scans the tag and the electronic product code is generated. The radio frequency ID reader passes the electronic product code the microcontroller. The name and price of the product is processed by the controller and gets displayed on the LCD screen of the smart trolly. Where the customer can see their product details.To store the price of the amount and the billing data information can be stored in the microcontroller memory. The LCD acts as the interface with the microcontroller.

Where in the LCD display the customer can see that whether the product us been added or removed from the cart and it also shows the amount of bill the customer should pay. The amount can be payed through the online interface. As we conducted some test so that we infer that when putting an item into the smart cart or expelling a item from the cart is able to precisely read it. In the proposed system, the ultrasonic transducer is implanted so that in shopping malls or the supermarkets social distancing is followed. Thus the block diagram of the proposed system in shown in figure 4.1.

4 System Design

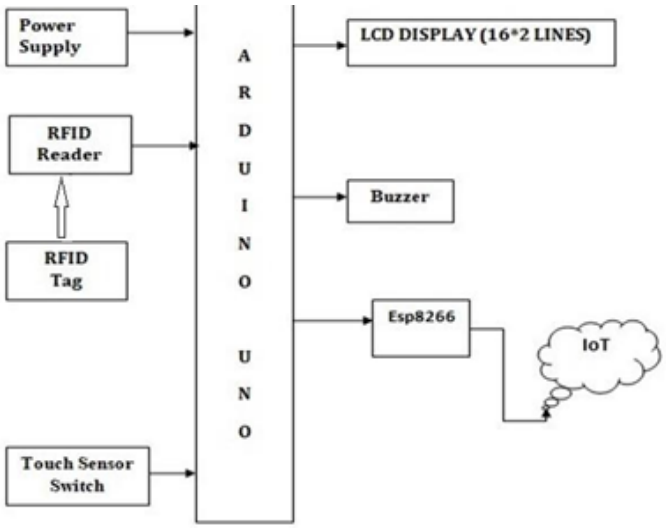

Figure 2: *Proposed system block diagram*

5 System Description

Proposed system consists of various blocks for different methodologies that is discussed below.

ISSN (Online): 2583-7052

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Arduino UNO

The Arduino Uno is a microcontroller board in context of the ATmega328. It has 14 electronic data/yield pins (of which 6 can be utilized as PWM yields), 6 clear data sources, a 16 MHz stylish resonator, a USB association, a power jack, an ICSP header, and a reset get. It contains everything foreseen that would help the microcontroller; just interface it to a PC with a USB association or power it with an AC-to-DC connector or battery to begin. The Uno contrasts from every last going before board in that it doesn't utilize the FTDI USB-to-serial driver chip. Or on the other hand perhaps, it consolidates the Atmega16U2 (Atmega8U2 up to change R2) modifiedas a USB to serial converter.

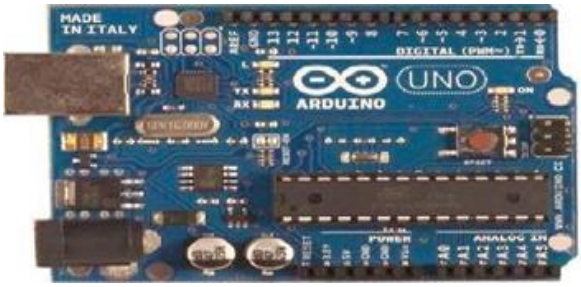

Figure 3: *ARDUINO UNO*

RFID Reader

An RFID or radio frequency identification system consists of two main components, a tag attached to the object to be identified, and a reader that reads the tag. A reader consists of a radiofrequency module and an antenna that generates a high frequency electromagnetic field. Whereasthe tag is usually a passive device (it does not have a battery). It consists of a microchip that storesand processes information, and an antenna for receiving and transmitting a signal. When the tag isbrought close to the reader, the reader generates an electromagnetic field. This causes electrons tomove through the tag's antenna and subsequently powers the chip. The chip then responds by sending its stored information back to the reader in the form of another radio signal. This is calleda backscatter. The reader detects and interprets this backscatter and sends the data to a computer or microcontroller.

Figure 4: *RFID Reader*

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pp. 173-181

Article Title: Smart Shopping Trolley Based On RFID

RFID TAGS

RFID Tag An RFID reader is a device used to gather data from an RFID tag that is employed to trace individual objects. Radio waves are used to transfer signals from the tag to a reader. RFID is also a technology similar in theory to bar codes. The RFID tag should be among the range of an RFID reader, which ranges from three to a few hundred feet, soon be scan. RFID technology permits many things to be quickly scanned and permits quick identification of a particular product, even once it's encircled by many various things. RFID tags haven't replaced bar codes thanks to their price and therefore they have to singly determine each item.

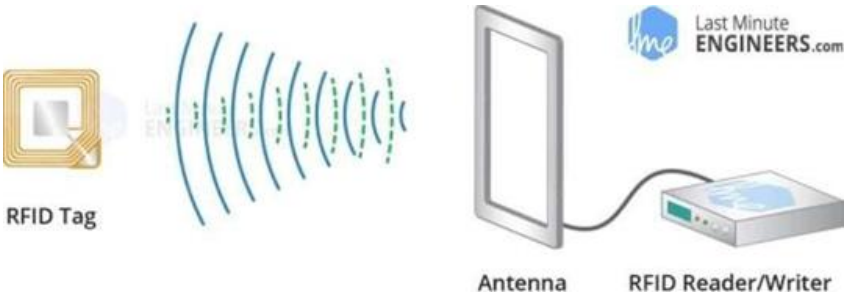

Figure 5: *RFID TAGS*

Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers includealarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Figure 6: *Buzzer*

Touch Sensor

Here touch sensor is used as switch. If the customer decides to remove the product from thecart can use the Touch Sensor switch and remove the product from the cart.

Figure7: *Touch sensor used as a switch*

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WI-FI Module (ESP8266)

Wi-Fi is an innovation for remote neighbourhood with gadgets in light of the IEEE 802.11 guidelines. Wi-Fi is a trademark of the Wi-Fi Alliance, which confines the utilization ofthe term Wi-Fi Certified to items that effectively total interoperability accreditation testing.

Figure 8: *Wi-Fi Module*

LCD Display

LCD is an abbreviation for liquid crystal display. It is one type of electronic display module that is utilized in many different circuits and gadgets, such as TV sets, computers, calculators, mobile phones, and so on. Seven segments and multi-segment light-emitting diodes are the major applications for these displays. The primary advantages of utilizing this module are its low cost, ease of programming, animations, and unrestricted character, special, and animation display options.

Figure 9: *LCD Display*

6 Result And Discussion

Smart human following shopping trolleys are a promising solution for shopping malls looking to provide a more personalized and efficient shopping experience for their customers. Customer adds products to their trolley, the product details and price are automatically added to the bill stored in the trolley's memory. If a product is removed, the cost is deducted from the bill.The total number of items and cost are displayed on an LCD screen.

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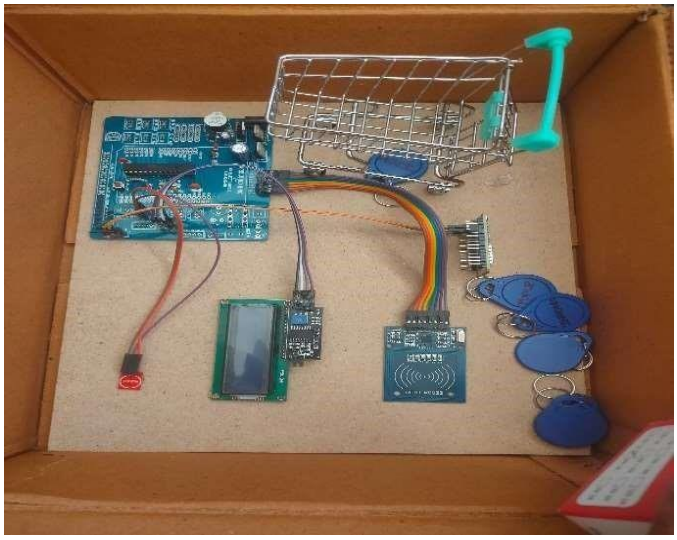

Figure 9: *System implementation*

7 Conclusion

Smart shopping application creates an automatic central billing system in malls as well as in supermarket with the maintenance of the social distancing. The main agenda of this project isto avoid crowd in shopping mart in an efficacious approach. Many obstacles can be removed andeverything becomes customer friendly. Hence this project reduces a huge cost which is spent on many modules to connect it with servers and routers in each shelves to transfer the information tothe server.

Future Scope

In future it will be developed that the customer just type the name of the consumer products he/she want to purchase on android device, the trolley will automatically guide them to where theproducts placed.

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Article Title: Smart Shopping Trolley Based On RFID

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