A Review Paper : RFID Based Intelligent Trolley

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ABSTRACT:
Now-a-days people mostly prefer physical stores like shopping malls and mega mart for retail shopping. We can see huge rush in malls and mega marts. So at the billing counter customer have to wait in long queue for only pay the bill. It creates inconvenience to the customers and also cause of wastage of time. Our aim is to reduce the challenges mentioned above. So we use RFID instead of bar codes. We create a trolley with a microcontroller device and a RFID reader. RFID is attached to all the items of the store. When a person put an item in the trolley the price of the item is stored in the memory of microcontroller and displayed on the LCD attached with the microcontroller.

KEYWORDS-RFID reader, RFID tags, Zigbee module

INTRODUCTION:
RFID are advanced technology than barcodes and provides a better service. In our Intelligent Billing Trolley system environment, each product will have the passive Radio Frequency ID tag which is bearing a unique Electronic Product Code. This Electronic Product Code provides the info like name, price etc about the product. When the customer will put the product in the Intelligent Billing Trolley, the Radio Frequency ID scans the tag and the Electronic Product Code number is known by Radio Frequency ID reader. Radio Frequency ID reader passes the Electronic Product Code to the micro-controller where microcontroller compares the Electronic Product Code with the database of the system containing various products. After that the name and price of the product obtained by the microcontroller gets displayed on the LCD display of the Intelligent Billing Trolley, where user can see the product information. The microcontroller also passes the data obtained from the database to the transmitter from where the data is wirelessly transmitted to the billing computer.

RFID TECHNOLOGY:
RFID stands for **Radio-Frequency Identification**. It refers to small electronic devices that consist of a small chip and an antenna. It provides a unique identifier for that object. . RFID is used to automatically identify people, objects, and animals using short range radio technology to communicate digital information between a stationary location (reader) and a movable object (tag). It has two categories active tag and passive tag. [1]

PASSIVE TAG:
Passive RFID systems use tags with no internal power source and instead are powered by the electromagnetic energy transmitted from an RFID reader. Three main parts make up in a passive RFID system – an RFID reader or interrogator, an RFID antenna, and RFID tags. Passive tags wait for a signal from an RFID reader. The reader sends energy to an antenna which converts that energy into an RF wave that is sent into the read zone. Once the tag is read within the read zone, the RFID tag's internal antenna draws in energy from the RF waves. The energy moves from the tag's antenna to the IC and powers the chip

which generates a signal back to the RF system. This is called backscatter. The backscatter, or change in the electromagnetic or RF wave, is detected by the reader (via the antenna), which interprets the information.

ACTIVE TAGS:

Active RFID systems use battery-powered RFID tags that continuously broadcast their own signal. Active RFID tags are commonly used as "beacons" to accurately track the real-time location of assets or in high-speed environments such as tolling. Active RFID systems have three essential parts – a reader or interrogator, antenna, and a tag. Active RFID tags possess their own power source – an internal battery that enables them to have extremely long read ranges as well as large memory banks. Two different types of active RFID tags are available – transponders and beacons. [2]

RFID VS BARCODES:

Barcodes have very low throughput, only one tag can be read at a time. Scanner must physically see each item directly to scan. The scanner should be at the straight line of sight to scan the barcode tag. Barcodes scanner has only ability to read and barcodes can't be read if they got damaged. Unlike the barcodes RFID tags have high throughput, multiple tags can be read simultaneously. For scanning RFID tags a straight line of sight is not required. Items can be oriented in any direction, as long as it is in the read range. It has ability to read, write, modify and update. RFID tags are highly reusable. [2]

SYSTEM ARCHITECTURE:

The intelligent trolley system mainly consists of four parts. Power supply, input Section, controlling system and output system.

POWER SYSTEM:

The microcontroller needs power supply of 5V. We use 9 or 12V battery with a voltage regulator. Voltage regulator supplies constant power supply of 5V.[5]
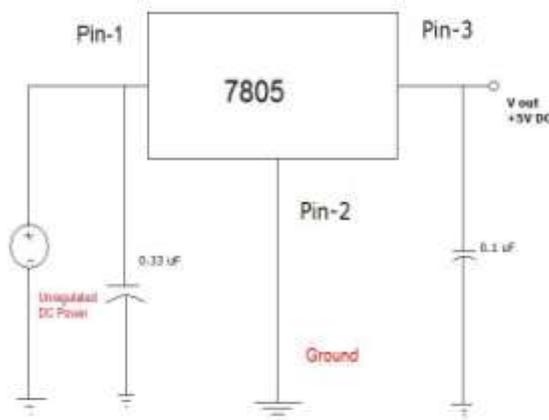

Fig 1.1

INPUT SECTION:

Input section consists of a RFID reader which is attached to a microcontroller and a zigbee transmitter module. A LCD is connected to the microcontroller which shows the bill. Zigbee module is used to transmit the bill and the item's data stored in the microcontroller to the main system.
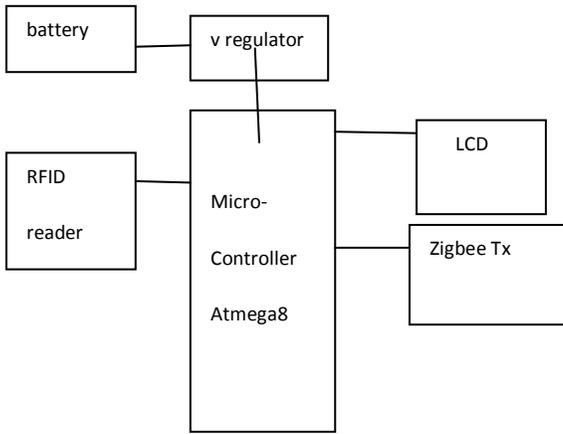
Fig 1.2

CONTROLLING SYSTEM:

Microcontroller consists of processing core, memory and input/output peripheral. It is the main processing unit of the intelligent trolley system. It processes the billing system and stores the billing and item details and then transmits it to the zigbee transmitter module.

Output section- In output section a zigbee receiver module is attached to the main system or computer, which receives data from zigbee transmitter module and transmits it to the main computer.
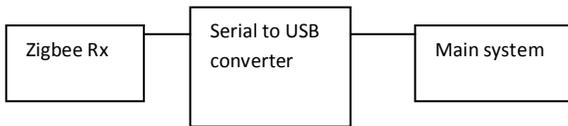
Fig 1.3

EXISTING SYSTEM:

Nowadays bar codes are widely used in super markets or malls. In this method there are barcode labels on each product which is read by a bar code scanner. A barcode reader (or barcode scanner) is an electronic device that consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port. When we select any product for buying we put it in the trolley and take it to the billing counter. The cashier scans the product through the barcode scanner and gives us the bill. But this becomes a slow process when lot of products is to be scanned, thus making the billing process slow. This eventually results in long queues.

PROPOSED SYSTEM:

As RFID technology is found to be more comprehensive than barcode. So in proposed intelligent trolley RFID technology is used instead of barcodes. In a mall system all the items all the items will be attac hed with an RFID tag and all the trolleys have the RFID scanning techonology device. An RFID reader can access the information of the tags from a distance of around 300 feet. [4] RFID technology also scores over barcode technology in the terms of speed. So the tags are scanned in the trolley and the billing is done itself in tne trolley's RFID scanning device and is be shown on the LCD attached with the RFID scanning device.

WORKING SYSTEM:

The proposed system is planned to work in following way:-

When the customer purchase a product, she/he first scans the RF tag of the product using the RFID reader and then places it into the trolley .While the customer is scanning the RF tag of the product, a price of the product is taken and stored in the system's memory. Information stored in system's memory is compared with the lookup table. If matches are found then cost, name of respective product gets displayed on the LCD. At the same time microcontroller sends the same information to computer for billing purpose. Here we have used IR sensor for counting purpose. This works as the IR sensor continuously emits IR rays. If we put a product in a trolley ant at that time there is obstacle for IR rays, then it would result in interruption in counting of products in trolley. This recorded data is stored in microcontroller. Counting is mainly done for security purpose. If in case while wandering round the mall someone removes the RFID tag and puts the product in trolley then counting the no of items helps to get information of items purchased. Thus counting is done but there is no addition of cost respective product in bill. This shows the increase in number of products but not increase in bill. If an unwanted product is removed from trolley then it decreases the number of products as well as bill. Double entry of product deletes the product name with respective to cost of product. After completion of shopping, a key is pressed indicating final billing of all the products. Thus the final information of all products is transmitted to a computer with the help of serial communication & the final billing is done by software on computer.

CONCLUSION:

The intelligent trolley system replaces the use of traditional barcodes. Barcode readers require a direct line of sight to the printed barcode, RFID reader do not require a direct line of sight. RFID tags can be read at much greater distances. RFID tags are reusable so can be used again and again. So the use and impact of RFID is efficient and convenient. The automatic billing system using RFID provides great convenience and reduces the complexity of shopping. It also reduces the wastage of time for billing and payment, and also plays a great role in inventory management of the mall.

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