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Smart Shopping Trolley using RFID

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Abstract:
Nowdays, people are getting too busy in their schedule but still they need to spend time on their basic need like purchasing goods and all stuffs from shopping market. In Shopping malls, long queues for billing waste their time again. Thus to reduce the time consumption during shopping our system is introduced. In our Trolley system we use RFID tags on products that one wants to buy, which are read by barcode scanner and the Cost of that product is displays on the LCD screen attached tour system. As customer buy then exact product its Price is add on the previous amount. The cost of the product is given to microcontroller by using Zigbee Communication from host PC. Zigbee supports bidirectional communication between microcontroller and host PC. Customer get direct bill at the billing section which is already stored at host PC which ultimately reduces queue.

Keywords: Microcontroller ATmega16, RFID Tags, Barcode Scanner, GLCD, Zigbee.

I.INTRODUCTION

The invention of wireless technology with other communication techniques has been helping us in making electronics domain very popular. A modern futuristic product is the one that provides the comfort, convenience and efficiency in everyday life. Shopping is one of the interesting things and basic need for every human. At present no such embedded system is used in shopping. But this simple task cannot be easily perform because customer has to wait for billing procedure for longtime. The aim of this project is to utilize new updated technologies and overcome from the difficulties during shopping in consumer retail shop. Thus we are proposing the smart trolley system by using microcontroller as an updated technology.

The System consists of an RFID based trolley which communicates with the billing counter wirelessly through Zigbee Transmitter. Each trolley will consist of a same type of hardware with unique trolley address. The customers will be able to scan the items by their own and the LCD screen on the shopping cart will keep updating the total. The billing counter can at any point of time inquire about the current items present in the trolley. This will turn out to be very beneficial for the retail stores as more people will enjoy the shopping experience and come more often to shop. The system helps the store management section with an automatic update of the inventory on every purchase of a product. The Smart Shopping Cart has the potential to make the shopping experience more comfortable, pleasurable and efficient for the customer and the inventory control easier for the store management.

II. LITERATURE SURVEY

A. Barcode Scanner:- A barcode is an optical device which shows data on certain products like unique ID. Purpose of using

barcode scanner is to automatically identify the product from its unique barcode label printed on it .This barcode reader is combination of hand held unit (LED array type source & CCD capture)and decoder circuit which receives raw data of Barcode and outputs serial data at 9600 bps with RS 232 level output suitable for interfacing with microcontrollers or host PC serial port

Figure.1. Barcode scanner

B. IR sensor:-
An infrared sensor is an Electronic device which emits in order to sense some aspects of the surroundings. An IR sensor can measure heat of an object and detects the motion. In infrared spectrum, all objects radiate some form of thermal radiations and these types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is an IR photodiode which is Sensitivity to IR light of the same wavelength as that Emitted by the IR LED.
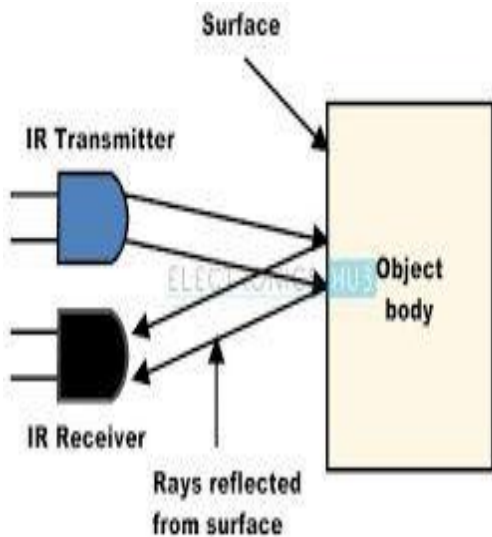
Figure.2. IR Sensor

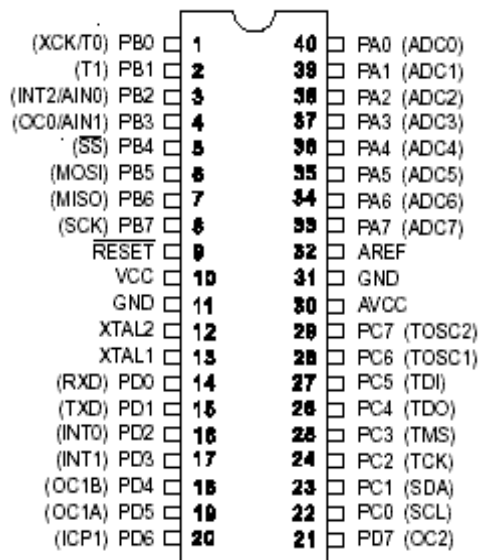*C.ATmega16:-*ATmega16 is an 8-bit high performance microcontroller of Atmel's

Figure.3. ATmega16

Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing)architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega 16 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes.

D. GLCD:- The **Graphical LCDs** are used to display customized characters and images. The Graphical LCDs find use in many applications; they are used in video games, mobile phones, lifts etc. as display units. This LCD has a display format of **128x64 dots** and has yellow-green color backlight. Each LCD needs a controller to execute its internal operations. This LCD uses two **KS0108 controllers**. The **128x64 LCD** is divided into two equal halves with each half being controlled by a separate KS0108 controller. Such LCDs (using KS0108 controller) involve paging scheme, i.e., whole LCD is divided equally into pages.
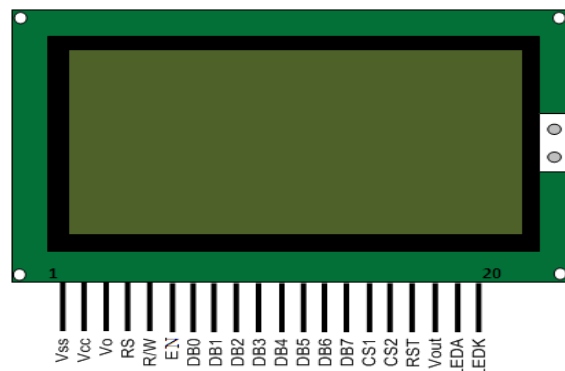

Figure.4. GLCD

Figure.5. Pin Diagram of GLCD

E.ZigBee:- The Zigbee RF Modules was engineered to meet IEEE802.15.4 standards and support the unique needs of low-cost and , low power wireless sensor networks. The modules requirement of minima lower and provide reliable delivery of data between devices. The modules functions within the ISM 2.4GHz frequency band and are pin-for-pin compatible with each other
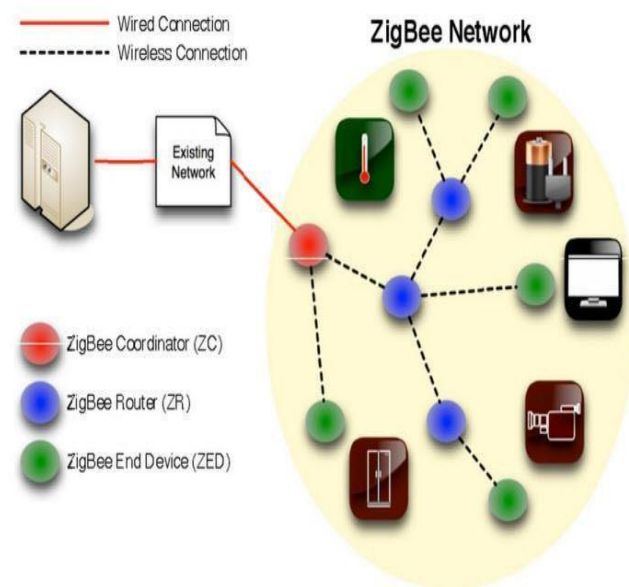

Figure.6. Zigbee network

III. BLOCK DIAGRAM

The Block diagram shows the different component used in the Smart Shopping trolley is Microcontroller, Power Supply,

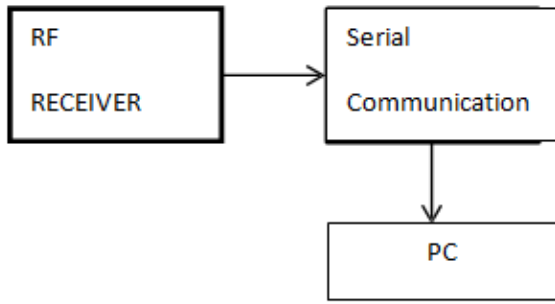barcode reader, IR Sensor, LCD display, buzzer, zigbee software.

Figure.7. Server Section

RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consists of an oscillator to create the carrier frequency RFID and barcodes are similar in that they both are data collection technologies, means they automate the process of collecting data. However, they also differ significantly in many areas. An RFID reader can access the information of the tag. Reader send this code to microcontroller, after matching code with codes stored in memory, controller reads product's name, cost & other details. The nit displays on LCD. The item details like name, cost & total bill of items inserted in trolley are displayed on LCD.
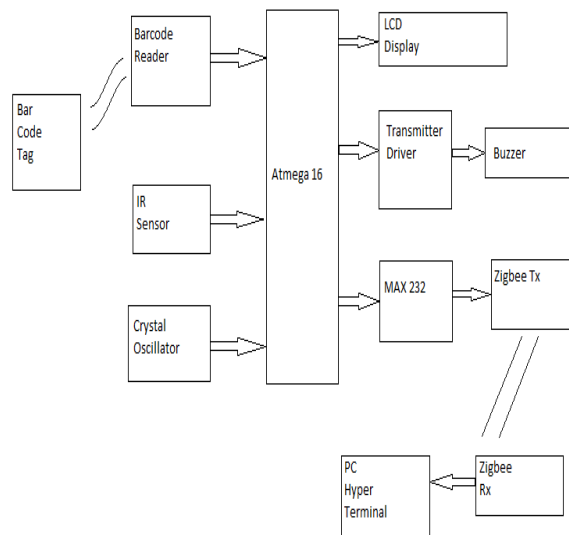
Figur.8. Block Diagram

When person puts an item in the trolley, its code will be detected by BARCODE Scanner which is interfaced with processor. BARCODE Scanner is interfaced serially within RF24L01. As we put the items, the costs will get added to total. Thus the billing is done at the trolley itself .LCD used is 16X2 character alphanumeric type display which interfaced with processor to transmit the billing details from trolley to the host PC at counter wirelessly when customer completes putting the items in trolley and reaches at counter of billing section. mEach trolley is attached with Product Identification Device (PID). Through ZigBee communication, PID device sends its information to automated central billing system, where the net price of all the. purchased products is calculated. When a customer with the cart enters a shopping aisle, the cart is

brought in range of the IR Receiver and the microcontroller checks for the aisle information code. The aisle information code is transmitted over the ZigBee wireless from the cart to the server. Based on the aisle number received the database is queried and relevant information is retrieved and transmitted to the cart via the ZigBee module. The received information is stored in the EEPROM present on the cart. This serves as a temporary database until the customer exits the particular aisle that he/she is in. The relevant products information is displayed on the display unit. Every product has an RFID tag which contains a Unique ID. These ID's are fed in the database assigned to the corresponding products. If there needs to be a purchase done, then that product can be dropped in the cart where the RFID reader reads the tag. The information of the product is extracted and displayed on the LCD screen. At the same time billing information is also updated. Upon exit of the aisle, the aisle info is sent to the server along with details of purchase. Server then stores them in the database. These steps are repeated until the end of shopping button is pressed. Once the "Complete" button is pressed there is an option provided to end the shopping with the same products or to delete some of the products from the cart. This goes by the customer choice. At the end of shopping, the customer can straight away pay the bill and leave.

HARDWARE USED

Trolley Unit: In this unit, the system is attached to a RFID reader and Bluetooth Controller. As the user puts the items in the trolley the reader on the trolley reads the tag and sends a signal via Bluetooth Controller to the system. If it matches then it shows the name of item on android device & also shows the total amount of items purchased.

Billing Unit: As soon as the shopping is over the user comes near the billing section .The total bill will display on the billing computer.

RFID Tags: Tags are of two types: passive tags which have no battery life and active tags which have battery life. RFID tags released for automatically identifying a person, a package or an items. These are transponders that transmit information. RFID tag contains two parts. One is integrated circuit for modulating, storing and processing information and demodulating radio frequency (RF) signal. The second is an antenna for receiving and transmitting signal.

RFID Reader: RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consists of an oscillator to create the carrier frequency; a modulator to make impact on data commands upon this carrier signal & a receiver that contains demodulator to extract the data returned.

V.APPLICATIONS

• Reduces manpower required in billing section. This can reduce the expenses incurred by the management.

• Users can be aware of the total bill amount during the time of purchase.

- Reduces time spent at billing counter and Increases customer satisfaction.

VI.CONCLUSION

Taking into account the changing trend in retail shopping, we come to a conclusion that the Intelligent Shopping Basket is most certainly a definite necessity for the Retail marketing industry to step up their portfolios, cope up with the advancement in technology and save time and manpower. This project simplifies billing process, makes it swift and increases the security using RFID technique.

VII. REFERANCE

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