# ADVANCED SHOPPING TROLLEY  USING NOVEL TECHNOLOGY

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ABSTRACT –
To begin with, the modern technology has increased the standard of living for humans. Today however, shopping has developed into a world of its own.The "Smart Shopping Trolley Using RFID and Zigbee" aims to revolutionize the shopping experience by introducing a technologically advanced shopping cart. This innovative cart is equipped with Radio-Frequency Identification (RFID) and Zigbee communication, creating a seamless and efficient shopping process.RFID technology allows customers to simply place items with RFID tags into the cart. The system automatically identifies and records the items, eliminating the need for manual scanning and checkout queues. As shoppers move through the store, the Zigbee communication system keeps track of their cart's contents, ensuring accurate billing.The aim is to reduce the time consumption needed for the billing system.

Keywords: Power supply, PIC Microcontroller, RFID, Zigbee transmitter and receiver, LCD display.

INTRODUCTION:
Purchasing the groceries in the marts and shopping at big malls is becoming daily activity for the people who live there. We can see more people in the malls on holidays and weekends. This crowd will shows more interest to buy the products. This trolley will be more helpful to the people who purchased different items put them in trolley. After total purchase one need to go to billing counter for payments. At billing counter, the customers have to wait for long period of time, cashier have to prepare the  bill using bar code reader which is very time-consuming process and results in long queue at billing counter. Our aim is to develop the system which can be used in shopping malls to solve the problem mentioned above.

ZIGBEE is a bluetooth or wireless USB devices, so  devices have the ability to form a mesh network between nodes. Meshing is a type of concatenation from one device to another. This method   allows the short range of an songingle node to be expanded and multiplied, covering a much more area.

To implement this project we are using microcontroller, RFID, ALCD (16x2), wireless communication will be done by using ZIGBEE. An embedded system will be placed on trolleys which are used in the malls. It will consist of RFID reader. All the groceries and items in the mall will be equipped with RFID tags. When person put any item in the trolley, it's  code will be detected and the price of that item will be stored in memory. As we are adding the items the costs will get added to total. Thus the billing will be done at the trolley itself. In LCD we can able to see the item name and its cost. For detecting different items RFID reader will be used. LCD used will be 16X2 alphanumeric displays. It will be used to display item names, item cost etc.

The Microcontroller is programmed using Embedded C language which provides effective environment for performing the task of the project and we are using PCB software to design the circuit boards .

## 3. HARDWARE COMPONENTS:

The short introduction of distinct modules used in this undertaking is mentioned below:
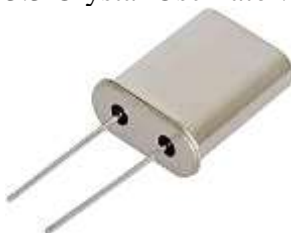
### 3.1 PIC Microcontroller:



Fig: PIC Microcontroller

A microcontroller can be considered a self-contained system with a processor, memory and peripherals and can be used as an embedded system.The 16f72 micro controller is powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller.The PIC 16F72 is a 28 pin IC in the physical structure with 3 ports like port A (6 pins), port B (8 pins), port C (8 pins) excluding the supply pins(4 pins).

### 3.2 RFID Reader:



An RFID system consists of three components: an antenna and transceiver (often combined into one reader) and a transponder (the tag). The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. The data is used to notify a programmable logic controller that an action should occur. The action could be as simple as raising an access gate or as complicated as interfacing with a database to carry out a monetary transaction. Low-frequency RFID systems (30 KHz to 500 KHz) have short transmission ranges (generally less than six feet). High-frequency RFID systems (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) offer longer transmission ranges (more than 90 feet). In general RFID is the higher the frequency, the more expensive the system. RFID is sometimes called dedicated "short range communication (DSRC)."

### 3.3 Crystal Oscillator:

An oscillator is an electronic circuit that produces a repetitive electronic signal.The maximum operating frequency of PIC Microcontrollers is 20 MHz.Crystal oscillator is used in the project because of the fact that crystal is more stable to temperature than other types of oscillators.
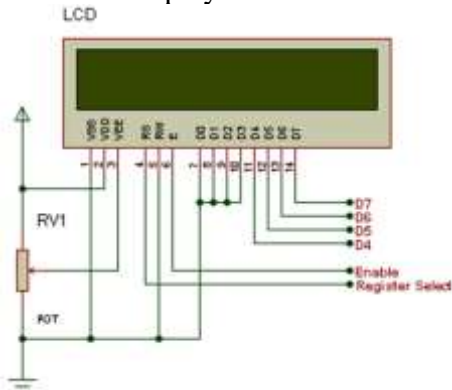
3.4 LCD Display:



Fig4: 16*2 LCD Display

A liquid crystal display (LCD) is a thin, flat electronic  visual display that uses the light modulating properties of liquid crystals.Liquid crystal display is very important device in embedded system. It offers high flexibility to user as he can display the required data on it. One of the most common units attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 displays. This ability sixteen characters per line by 2 traces via 2 lines, respectively.

3.5 ZigBee transmitter and receiver:



Fig:hc-12 ZigBee module

ZIGBEE is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks.HC-12 wireless serial port transmission module is a young blood numerous embedded wireless data transmission module. It's wireless running frequency range is 433.4- 473.0MHz,many channels can be set , with the stepping of 400khz and there entirely 100 channels . The extreme transmitting power of component is 100mW , the receiving sensitivity is -117dbm at band rate of 5,000bps in the air and the communication distance is 1000m in open area .The module is encapsulated with stamp hole, can adopt patch welding, and its dimension is 27.8mm ×14.4mm ×4mm (including antenna cap, excluding spring antenna), so it is very convenient for customers to go into application system. There is a PCB antenna pedestal ANT1 on the module, and user can use external antenna of 433M frequency band through coaxial cable; there is also an antenna solder eye ANT2 in the module, and it is convenient for user to weld spring antenna.

4. BLOCK DIAGRAM:

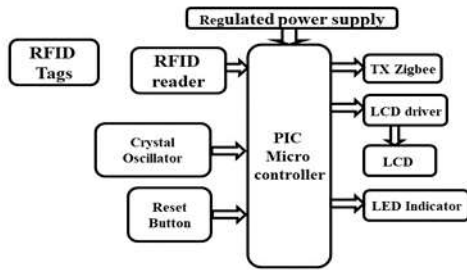SMART SHOPPING TROLLEY USING RFID AND ZIGBEE



Fig 1: Block diagram of trolley section

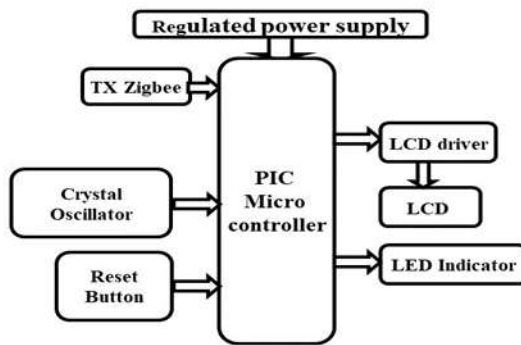SMART SHOPPING TROLLEY USING RFID AND ZIGBEE



Fig 2: Block diagram of billing section

The RFID reader is connected with the microcontroller and RFID tag is attached to each and every product . When the goods are placed in the trolley ,the RFID tags attached to goods are decoded by RFID reader interface to Microcontroller and information is stored and displayed on LCD .

The system automatically sends the selected good number along with cost onto the PC of billing counter using wireless zigbee. In this project we are using LCD instead of PC.

The proposed system consists of two sections:
☐        (i) Trolley section (user).
☐        (ii) Billing section.

The Trolley section consists of RFID module, Zigbee module, LCD display and microcontroller. The input module is the RFID reader which gives the information of the goods when it decodes the RFID tag of the good, this information is displayed on the LCD along with cost details. The output modules are LCD. The RFID reader continuously checks the placing of the goods package inside the trolley or removing from the trolley using RFID tag attached to it and these details along with the cost is automatically uploads onto the PC section or billing counter section.

The monitoring or billing section mainly connected with the computer at the bill counter consists of zigbee and PC. The details of selected items along with costs are automatically fed as input to the PC using zigbee module and displayed on to the monitor of PC.

5. RESULT:

The project "Smart Shopping Trolley Using RFID and Zigbee" was designed an smart shopping trolley using RFID technology and display billing details on the LCD using wireless ZIGBEE technology. The Smart Shopping Trolley using RFID and ZigBee system implemented using the PIC Microcontroller. The PIC Microcontroller is powered by a 5V adapter. This smart shopping trolley will send the total product details and bill into the billing section through ZIGBEE wireless technology.

6. CONCLUSION:

The present model gives an Integrating characteristic of all the hardware aspects which has been used and developed in it with PIC Microcontroller. The Presence of each and every module has been reasoned out and positioned very carefully. Hence the contributing to the excellent working unit for Smart Shopping Trolley using RFID and ZigBee using Embedded C device has been designed perfectly. Secondly, using notably superior IC's like PIC microcontroller operating device technological know-how with the assist of growing technology. Thus, the assignment has been efficiently designed and tested.

This smart trolley able to upload the total product names and total bill of the trolley into the billing section through zigbee technology. This system will able to monitor the product details and total bill amount on LCD module.

7. ACKNOWLEDGEMENT:

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