SMART SHOPPING USING SMART TROLLEY

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Abstract - *The modern electronic technology is based on embedded a system which is integrating thousands of transistors on single silicon chip. The main of aim of growing technology is to make life became easier. Nowadays Shopping mall is a place where people get their daily necessities. In mall for purchasing number of items it requires trolley. Every time customer has to do calculations of those items & need to compare it with his budget in pocket. After this procedure, customer has to wait for billing. So to avoid headache like pulling trolley, waiting in billing queue we are introducing new concept that is "SMART SHOPPING USING SMART TROLLEY". In this system we use RFID tags will be on the product. Whenever the customer puts a product into trolley it will get scanned by RFID reader and product price and cost will be displayed on LCD display. Like this the process goes on. We will use Bluetooth module which will be used to transfer data to main computer. AVR microcontroller is used to store the products price and total billing,. 16x2 LCD display will be used to display products names, products cost etc. Total billing will be displayed at main counter where payment can be done.*

Key Words: RFID reader; RFID tags; AVR Micro-controller; Bluetooth Module; Switch; LCD Display.

1. INTRODUCTION

The human lifestyle has changed day to day because of growing technology. Embedded system is based on microcontroller. The life of a common human being has become a very fast and hectic. Time is money for today's generation. Therefore people do not have much time to spend for shopping which is necessary in daily life. That's why people prefer shopping in the malls or big shops. People get daily necessities like cloths, vegetables, so many different things at the same place. This saves them from going into different shops to purchase only a limited type of products. Though shopping in malls gives the benefit of saving time. People have job so they do not have much time. They get free time on holiday. In holidays and special offers the huge crowed in malls. People enter in the mall every person takes product put into trolley. After the shopping is done that person have to stand in the queue for billing. In the billing process a sell person scan barcode of each and every product and gives final bill. This process is very time consuming. To avoid this problem we design smart trolley. In smart trolley we use different techniques. There have been a number of methods designed for smart spending trolleys in order to make shopping easier for the customers in malls/shops. It reduces the time of customers by avoiding standing in long billing queues .This smart trolley also reduces the man-power. This system is reliable and easy to use.

2. LITERATURE SURVEY

In [2], a centralized and automated billing system using RFID and ZIGBEE communication is employed. Each product is provided with a RFID tag. Each shopping cart is implemented with a Product Identification Device (PID) that contains microcontroller, LCD, RFID, and ZIGBEE module. Purchasing product information will be read through a RFID reader on shopping cart, this information is sent to the billing counter using ZIGBEE module. The billing system gets the cart information and EEPROM data, and then it accesses the product database and calculates the total amount of purchasing for that particular cart. This system mainly focuses in solving queue in the store. In [4], the smart shopping trolley application creates an automated central billing system for supermarkets and malls. Using PID (product identification), customers will not have to wait near cash counters for their bill payment. Since their purchased product information is transferred to central billing system. Customers can pay their bill through credit/debit cards as well. The system proposed is highly dependable, authentic, trustworthy and time-effective. There will be reduction in salary amount given to employees, reduction in theft. Also, the system is very time-efficient.

3. PRODUCT PERSPECTIVE

The major functionalities of the system are:-
In this system we are using RFID tags instead of barcodes. This RFID tags will be on the every product in the shop or a mall. Each trolley will have RFID Reader implemented on it, used to scan product. Each trolley will have Bluetooth module implemented on it. There will be a counter System. AVR controller will be used to store the data. 16x2 LCD display will be used to display products names, products cost and expiry date etc. If product is remove from trolley, first press the deduct switch, amount of that product deducted from total bill too.

4. HARDWARE INTERFACES

4.1 Microcontroller Unit (ATmega328p)

The microcontroller unit is used to store read the information regarding the product and interfacing LCD. For our system we are using AVR microcontroller ATmega328p.The ATmega328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. It has 23 Programmable I/O Lines , 32 General Purpose Registers, Operating Frequency 20MHz, 3 Flexible Timers/Counters,10-bit A/D converter, Internal and External Interrupt, Serial Programmable USART.
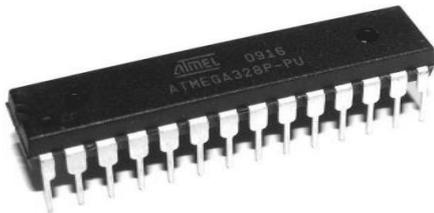
Fig -1: ATmega328p

4.2 Memory

Three types of memory systems:-

SRAM: This is called as static Random Access Memory where the sketch creates and implemented when it runs. It is a volatile memory and 2KB SRAM is available.

EEPROM: It is non-volatile memory and long-term information can be stored in this memory space. 1kb of EEPROM is available.

FLASH MEMORY: This memory stores non-volatile. 32kb of Flash memory is available.

4.3 Bluetooth Module

The Bluetooth module HC05 is a MASTER/SLAVE Module. By default the factory setting is SLAVE. The role of module can be configured only by at commands. The SLAVE module cannot initiate a connection to another Bluetooth device but can accept connections. MASTER module can initiate a connection to other device. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to our embedded projects.
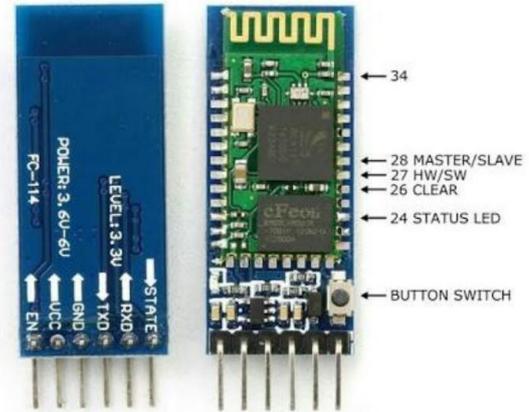

Fig -2: Bluetooth Module (hc05)

4.4 RFID Reader

Radio frequency identification (RFID) technology is a rapidly growing technology. It has the potential to make great economic impacts on many industries and applications. RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. RFID readers communicate with tags through an RF channel to obtain identifying information. 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. Depending on the type of tag, this communication may be a simple ping or may be a more complex multi-round protocol.

Fig -3: RFID Reader (EM-18)

4.5 RFID Tags

RFID is simple concept. There are two types of RFID Tags such as active tags and passive tags.

Passive Tags: - They have no power source of their own, generally operate at a maximum distance of 3 meters or less, and have power only when in communication with an RFID reader. The simplest of these tags is capable of holding something in the range of 64 bits of factory-written unique data; these are called "Class 0" tags.

Active Tags: - Active tags have their own power source, can actively and intensively transmit and processing data, and over considerable physical distances. Active tags can

communicate with readers 100 meters or more away. Active tags need much less signal from the RFID reader. Active tags are better.

Fig -4: RFID Tags

4.6 LCD Display

LCD is used to display the data. LCD we have used is 16x2 i.e. 16 characters in 1 line, total 2 lines are there. It requires +5V to operate. It is connected to port 2 of microcontroller. It acts as an output to microcontroller. It uses ASCII values to display the characters.

4.7 Deduct Switch

The deduct Switch is allotted for removing an item from trolley. When removal of item from trolley, first press key and remove the item. Then automatically price of item will subtract from total bill amount.

Fig -5: Deduct Switch

4.8 Jumper Wires

Jumper wires are used to transmit electricity between two points in a circuit. Main use of jumper wires are to analyze defects within the circuit or used to updating the circuits.

5. SOFTWARE INTERFACES

1. Embedded C Programming in AVR Studio
2. PCB Designing software (Proteus, Eagle)
3. OS Compatible:- XP, Windows 7, Windows 8

6. PROPOSED SYSTEM DESIGN

Nowadays there is a huge crowd in the shop or malls in cities. Specially, it becomes more crowded on holidays and special offers. People purchase different products in the malls and put them in the trolley. At the cash counter billing process is done using bar code scanner. This is very time consuming process. To avoid this we are developing a system which we call as "SMART SHOPPING USING SMART TROLLEY". In this system we are using RFID tags instead of barcodes. This RFID tags will be on the every product in the shop or a mall. Whenever the customer puts a product into trolley, it will get scanned by RFID reader/Scanner and product price and cost will be displayed on LCD display. Like this the process goes on. Each trolley will have Bluetooth module implemented on it. This Bluetooth module used to transfer data to main computer. AVR controller will be used to store the products price and total bill. 16x2 LCD display will be used to display products names, products cost and expiry date etc. when one product is remove from trolley, first press the deduct switch and scan product using RFID Reader. Then the amount of that product deducted from total bill too. There is another switch to press; total billing will be displayed at main counter where payment can be done.

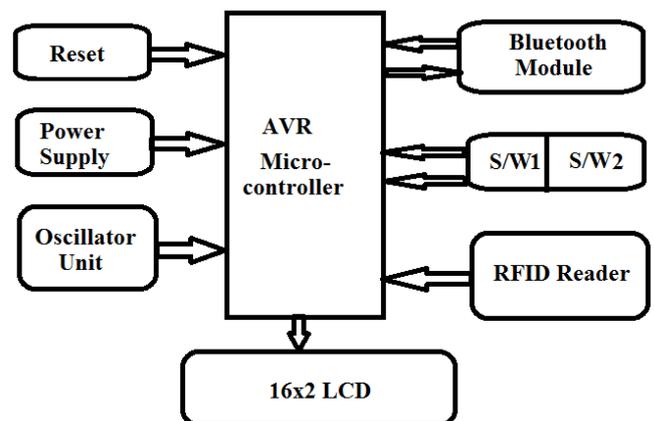The block diagram of proposed system is given below:

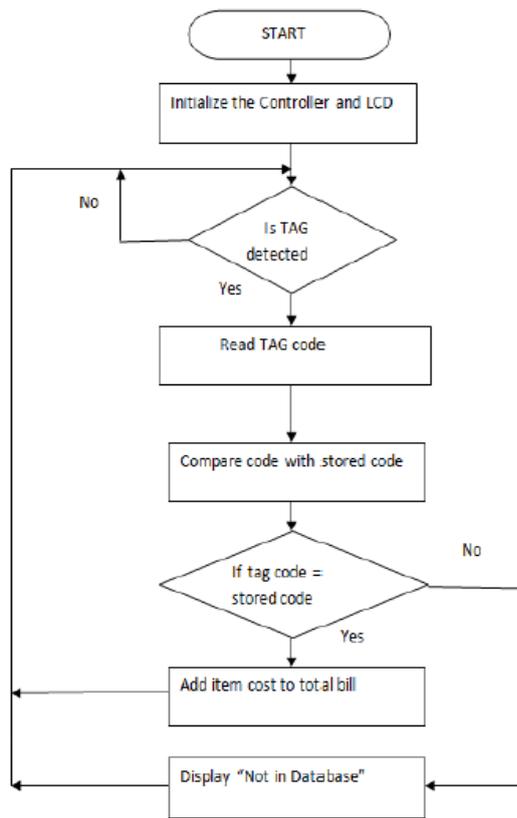**Fig -6**: Block diagram of proposed system

Fig -7: Flowchart for the System

Fig -8: Prototype of proposed system

7. CONCLUSIONS

This project "Smart Shopping Using Smart Trolley", name suggests the billing technique is improved. It is less time consuming as compared to regular billing technique. It is more reliable and provides ease for shopping. Here we conclude that the proposed system is time saving i.e. faster check out process.This system Reduces require number of salesman at the counter.

ACKNOWLEDGEMENT

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