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Automatic Billing Cart

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Abstract: *Shopping malls are a much more convenient place where people buy products of daily necessity. On holidays, a lot of rush can be seen in shopping malls and it becomes a very tedious task to get the billing done. In cosmopolitan cities, to shop at supermarkets and shopping markets an everyday task. Everyone of us has encountered long queues for the payment of the bill at shopping centers during holidays and weekends, the rush increase seven more at the time of festive seasons because of the discounts and product offers. Customers pick the products they want to buy and put them into their shopping carts. After customers have picked the products, they need to get the billing done. For the payment of the bill, they have to move to billing counter. At the billing counter the cashier, scans the products using a barcode scanner and then produces the bill. This is a manually operated process and hence, time consuming. Therefore, it leads to the long queues at billing counters. This paper proposes a way to develop a brilliant shopping cart system that will monitor the purchased products and help produce the bill in a less time-consuming way. This paper looks forward to solving the problem of rush at billing counter using a barcode scanner and RF transceiver that sends and receives the data.*

Keywords*:Barcodereader, Microcontroller, AT Mega 328, Billing system.*

I. Introduction

Picking out products is simple but waiting at the billing counter after that is a tedious task. A large number of customers and the generation of the bill at the counter consume too much time and result in long queues.

It is very time consuming to scan the details of each product. The customers have to wait in a long queue for this affair. Barcode scanners are a very important part of this complete system. A straight line of sight is required for the barcode reader to be capable of reading. They read the code and transfer the information to the computer for further proceedings. In the current billing system in different shopping complexes, bar codes are used for obtaining the information of a particular product for the generation of the bill. Each and every product has to be scanned separately.

So, a smart system is being introduced here that will be made available with the shopping cart itself. The system consists mainly of a barcode scanner, an AT Mega 328 microcontroller, and a 16x2 LCD screen. The customers will just have to scan the barcodes of the products as they place them in the shopping cart. The name and the price of each product along with the total amount will be displayed on the 16x2 LCD screen with each barcode being scanned. As the customer adds more products, the total amount on the LCD according to that will keep increasing. In case a customer decides against buying an already added product, the product can be removed by scanning the barcode of the same product once again. Accordingly, the price will be deducted from the total amount

being displayed on the LCD. After all the products have been added, the customer will press a button which will make the RF transmitter to send the information to the RF receiver.

II. Hardware Used in the Project

Barcode Reader

A barcode reader (or barcode scanner) is a specially designed scanner that has the capability to read barcodes that are printed on product packaging, decode the data from the barcode and send the data to a computer. It is made up of a source of light-beam, a lens and a light-sensor which translates the optical impulses into electrical signals. Additionally, almost all the barcode scanners contain a decoder circuitry that analyzes the image data of the barcode provided by the sensor and sends the content of the barcode to the output port. Fig. 1 shows a basic barcode reader.

Fig.1. Barcode Reader

AT Mega 328Microcontroller

ATmega-328 is essentially an Advanced Virtual reduced instruction set computer (AVR) microcontroller. It sustains up to 8 bits of data. ATmega-328 has an internal memory of 32KB. The other characteristics of AT mega 328 microcontroller are described as follows. ATmega328 works on 8-bits and has 28 pins, it follows RISC architecture and has program memory of 32KB. This program memory is of flash type. It has a 1KB EEPROM memory and SRAM memory of 2KB. There are 8 pins for Analog to digital conversion operations, which all combine to build Port A (PA0 – PA7). There also are 3 built-in timers; two of them are of 8 bits each whereas, the third one is of 16 bits. The operating voltage for AT mega 328 microcontroller ranges from 3.3V to 5.5V but generally 5V is used as a standard. It is said to have remarkable features because it is cost efficient, it dissipates low power, it has a programming lock as a security functions, and real timer counter which facilitates a distinct oscillator.

Fig2. AT Mega 328 microcontroller

16x2 LCD Display

Display units are the foremost vital output devices in electronics projects and embedded systems. A 16x2 LCD is one amongst the display units that are used in abundance. 16x2 LCD refers to two rows where 16 characters' display is possible in one line(row), and each character takes a space of 5X7 matrix on the display. In this project a 16x2 LCD module is connected to the ATMega328 microcontroller. The process of 8051 microcontroller and LCD interface seems a bit complex in the beginning, but after some practice and familiarization, it would be a cake walk.

Fig.3. 16x2 LCD display

Arduino UNO

Arduino Uno is an Atmega328 supported microcontroller board. It is a very cherished part of electronics. It has a total of 20 digital I/O and analog pins, a USB interface, and Atmega328 microcontroller. It contains Tx and Rx pins which are used for serial communication.

The board is equipped with sets of digital and analog input/output (I/O) pins which can be interfaced to numerous expansion boards (shields) and other circuits.

The operating voltage of Arduino UNO is 5V. Out of the 14 digital pins, 6 pins are for PWM output. It has a flash memory of 32kb and EEPROM of 1kb. The power can be provided to the Arduino UNO by an external power supply and also through a USB port. For providing power externally, a battery or an adapter (AC-to-DC) can be

used.

Fig.4. Arduino UNO

USB Host Shield

The Arduino USB Host Shield permits the user to make a connection between a USB device and an Arduino board. The Arduino USB Host Shield isMAX3421E built. It is a USB peripheral or a USB host controller which contains the required digital logic part as well as the required analog circuits part. Both of these are essential for the implementation of a USB peripheral host controller with Arduino.

Its operating voltage is 5Volts, USB Controller is MAX3421E. It can only tolerate a maximum value current i.e., 500mA when the Arduino is provided power by an authentic power supply which is connected to the Arduino power jack and 400mA when Arduino is provided power through the USB port.

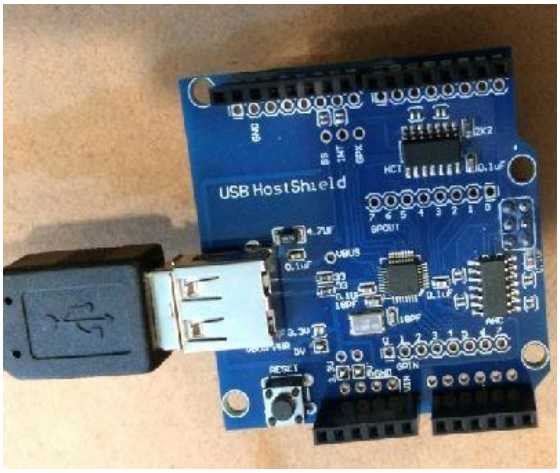

Fig.5. USB Host Shield

RF Transceiver Module

It gives a complete module of RF transmitter and receiver which can widely be used for the transmission of up to 3 KHz data by any standard source.

The transmitter module provides the user with the ease of operation and gives a low consumption of current. Data can be provided straight by using a microprocessor or by using an encoding device, therefore, minimizing the number of components and ensuring that the cost of hardware is low.

The RX – ASK is basically a compound receiver module. The RF Transmitter Receiver Module is a cost-efficient module. The TX-ASK is an ASK compound transmitter module. TX-ASK is constructed so that it is cost effective, fairly small in size and easy to use for designing purposes.

RF Transceiver Module specifications:-

- The outdoor range is 100 Meters
- The frequency of the receiver is 433 MHz
- The sensitivity value is 105 Dbm
- The value of supply current is 3.5 mA
- IF Frequency value is 1MHz
- Operating Voltage is 5V
- Frequency Range is 433.92 MHz
- The value of supply voltage is between 3V and 6V
- Output power lies between 4 and 12 Dbm

RF Transceiver Module features:-

- It consumes low amount of power.
- RF based applications are easy.
- Complete radio transmitter.
- Transmission range of this module is up to 50m.
- CMOS / TTL type input.
- The components are not flexible.
- Operating frequency is very stable.
- Current consumption is low.
- The range of operating voltage is wide.
- ASK Modulation

Fig 6. Rf Transceiver Module

III. Design and Implementation

First, different transmitter-receivers were tested to find the most suitable module for this project. Then, a data acquisition system was created for transmitting the data from the transmitter to the receiver.

Finally, the proposed model was implemented with the help of a barcode scanner, 16x2 LCD display, AT Mega 328 microcontroller.

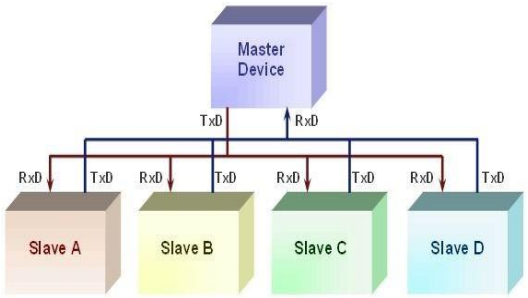

Fig.5. Block diagram of master slave approach

The proposed system consists of a bar code reader, a master device and a number of slave devices. So, when a product is placed in the cart, the bar code reader reads the barcode of the product and sends it to the microcontroller which displays the name of the product on the LCD display

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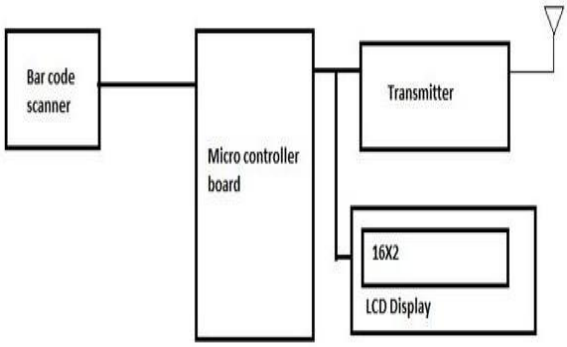

Fig.6. Block diagram of the transmitter end

The slave device transmits the generated code to the master device. The master device receives the code and generates a spreadsheet of all the numbers generated by the bar codes read.

In case a customer decides against buying an already added product, the product can be removed by scanning the barcode of the same product once again.

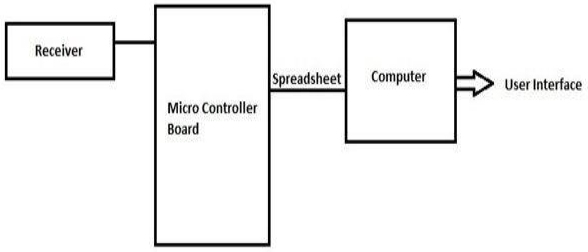

Fig. 7 Block diagram of the receiver end

The master device sends all the received information to the computer at the counter, the computer creates the bill immediately and the customer will not have to wait in the queue for long.

IV. Results and Discussion

In the other papers that have been referred to, the problem was solved by using RFID modules, ZigBee and IR. On the other hand, this paper proposes to solve the problem using a barcode scanner and RF transceiver. This paper is different because it does not depend on the availability of RFID tags which are not as easily available as barcodes on products. Rather, it uses barcodes and barcode scanner in order to solve the problem.

Another features that differentiates this project from others are- calculation and updation of the customer bill at the time of scanning, deletion of products added to the cart, display of the total amount for the products after the addition of each item, showing the details of the previously added products and making suggestions on the basis of comparison of cost among the products.

V. Conclusion and Future Scope

The proposed system presents a smart billing system for shopping complexes and supermarkets deploying a Barcode reader, an AT Mega 328 Microcontroller and a 16x2 LCD display.

The most suitable transceiver was picked, a data acquisition system to transmit the information from the transmitter to the receiver was constructed, barcode scanner was interfaced with AT Mega 328 microcontroller, 16x2 LCD Display was interfaced with AT Mega 328 microcontroller to display the details of the scanned products.

In this system, an additional functionality has been added which calculates and updates the total amount as soon as the customer scans the barcode of the each chosen product. It also facilitates deletion of products added to the cart as well as displays the total amount of money for the products added by the customer after the addition of each item. It is capable of showing the customers the previous products which have been added to the cart. It suggests the customers products to purchase, on the basis of comparison of cost among them. It helps to generate the bill in no time.

The future scope of this project is that its range can be increased by using a better and more expensive transceiver module which is capable of transmitting and receiving information over a comparatively larger range.

References

[1]. Kumar, A., Gupta, A., Balamurugan, S., Balaji, S., & Marimuthu, R. (2017). Smart Shopping Cart. 2017 International Conference on Microelectronic Devices, Circuits and Systems (ICMDCS).

[2]. V, V., P, P. K., & Reddy S, C. (2018). Smart Shopping Cart. 2018 International Conference on Circuits and Systems in Digital Enterprise Technology (ICCSDET).

[3]. Chandrasekar, P., & Sangeetha, T. (2014). Smart shopping cart with automatic billing system through RFID and ZigBee. International Conference on Information Communication and Embedded Systems (ICICES2014).

[4]. Singh, R., Verma, S., & Kriti, M. (2018). RFID and IR based Smart Shopping Mart Management System. 2018 International Conference on Communication Advances in Control and Computing, Networking (ICACCCN).

[5]. Balaji S, Balamuruguan S, Marimuthu R. (2017). Smart shopping cart. IEEE Internet of Things Journal.

[6]. Shelke CJ, Karde P, Thakre VM. (2015). Study of various perspectives of android security. International Journal of Innovative Research in Computer and Communication Engineering.

[7]. Gade A, Bhatt N, Thakare N. (2018). Survey on energy efficient cloud: A novel approach towards green computing.

[8]. Karpagam V, Balapriya S, Kalairubini G, Kalaivani A. (2017). Smart trolley with smart billing. International Journal of Computer Systems.

[9]. Bedi H, Goyal N, Kumar S, Gupta A. (2017). Smart trolley using Smart phone and Arduino. Journal of Electrical & Electronic Systems.

[10]. LarsanAro Brian A, Arockiam L, Sheba KeziaMalarchelvi PD. (2014). An IOT based secured smart library system with NFC based book tracking. International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE).