

Futuristic Intelligent Cart for Malls

Nandhini P, Nishitha Thomas, Priya Varshana B R, Priya Vathana P R, Suresh G

Department of ECE, Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India

ABSTRACT

There is huge change in technology, so the rate of people of all ages attracted towards electronic gadgets is increasing. In different type of industries the electronic devices like smart card reader, barcode and RFID scanner having more usage. This type of gadgets also required in supermarkets. In the existing, 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 and it becomes worst on holidays, special offers or weekends. The developed system consists of 4 key components/modules (a) Server Communication component (SCC) (b) User Interface and display component (UIDC), (c) Automatic billing component (ABC),(d)Navigation Component(NC) .SCC establishes and maintains the connection of the shopping cart with the main server. UIDC provides the user interface and ABC handles the billing in association with the SCC.NC used for navigation. These 4 modules are integrated into an embedded system and are tested to satisfy the functionality. The prototype is developed for commercial deployment.

Keywords : Atmega 162, Zigbee module, RFID, Visual Studio(Coding using Embedded C).

I. INTRODUCTION

Human beings have invented/adopted technology to their needs since their existence. Main purpose of innovation in technology, irrespective of the domain, has been in simplifying life on earth or making every day's work easier and faster. One regular task that human beings spend considerable amount of time is in shopping. According to a survey conducted by US Bureau of Labour, on an average, human beings spend 1.4 hours every day on shopping. A survey done by Visa in 2005, points out that an amazing 70% customers will walk out of a queue if the line is too long, and 10% are "seriously annoyed" the moment they step in a queue. According to a study conducted by CISCO Internet Business Solution Group, the top four reasons for shoppers to use technology are to (i) Find best price (63%), (ii) Save time (47%), (iii) Find best assortment (26%) and (iv) find best quality (25%). The emergence of new technologies, such as Radio Frequency Identification (RFID) and wireless networks, makes the shopping processes faster, transparent and efficient. Our aim is to develop an intelligent shopping cart (embedded system) which can be used in shopping malls to solve the problem

mentioned above. The Intelligent Shopping Cart is equipped with Radio Frequency Identification (RFID) for product identification and a consistent Zigbee connection with the shop's server. Besides, it also has an LCD display that informs customers about product prices, better products, etc. As soon as the object is dropped into or removed from the cart, the RFID tag identifies the product and updates the bill. "This shopping cart will change the way people shop as radically as ATM's changed banking." The proposed cart is easy to use and does not need any special training. In this paper, we discuss the System Design, Implementation, Testing, and Conclusions. The developed system consists of 4 key components/modules (a) Server Communication component (SCC) (b) User Interface and display component (UIDC) (c) Automatic billing component (ABC) (d) Navigation Component (NC). SCC establishes and maintains the connection of the shopping cart with the main server. UIDC provides the user interface. ABC handles the billing in association with the SCC. NC used for navigation. These 4 modules are integrated into an embedded system and are tested to satisfy the functionality.

II. EXPERIMENTAL WORKS

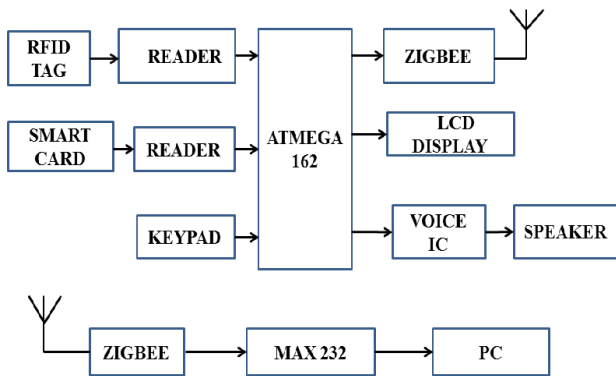


Figure 1. Block Diagram

HARDWARE MATERIALS

1. ATMEGA

162 The high-performance, low-power Microchip 8-bit AVR RISC-based microcontroller combines 16KB of programmable flash memory, 1KB SRAM, 512B EEPROM, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16MHz and operates between 2.7-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

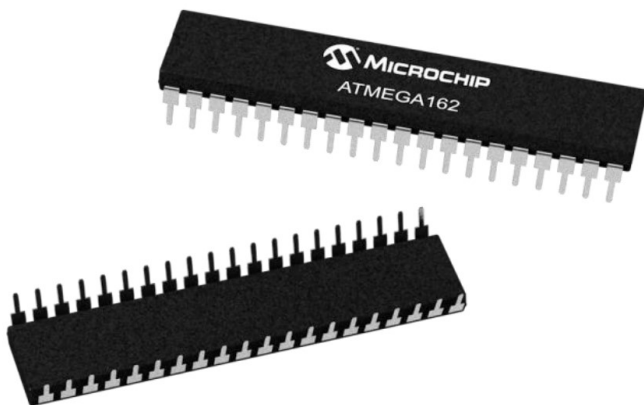


Figure 2. Atmega 162

2. ZIGBEE MODULE

Zigbee is a low-cost, low power, wireless web network. A zigbee devices can transmit data over long distance by passing data through a mesh network. Zigbee is typically used in low data rate applications that require long battery life and secure networking. The distance that can be achieved transmitting from one station to the next extent up



Figure 3. Zigbee Module

3. LCD DISPLAY

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (a sin a general-purpose computer display) or fixed images which can be displayed or hidden. Such as present words, digits, and 7-segment displays a sin digital clock. The same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. The LCD displays information about the steps that should be followed by the user etc.



Figure 3. LCD Display

4. RS232

Serial communication is the most simplistic form of communication between two devices. RS-232 is a standard by which two serial devices communicate. The connection must be no longer than 50 feet. Transmission voltages are $-15V$ and $+15V$. It is designed around transmission of characters (of 7 bits of length). Architecturally RS-232 is a bidirectional point to point link. Two independent channels are established for two-way (full-duplex) communications. RS-232 can also carry additional signals used for flow control (RTS, CTS) and modem control (DCD, DTR, DSR, RI)



Figure 5. RS232

5. Voice IC

Transmitter is a sound-to-electrical signal transducer consisting of two metal plates separated by granules of carbon. One plate faces outward and acts as a diaphragm. When sound waves strike this plate, the pressure on the granules changes, which in turn changes the electrical reference between the plates. The output of the carbon mic given to the inverting amplifiers inverting pin. So it amplifies the electrical signal and also inverts the signal to 180 degree. Then the output is given to another one inverting terminal. So again the electrical signal is amplified and inverts 180 degree. Now we get the original signal ($180+180=360$). Then the analog output is converted into digital signal by using the transistor and not gate. Then the output is given to the microcontroller ADC pin or external ADC IC.

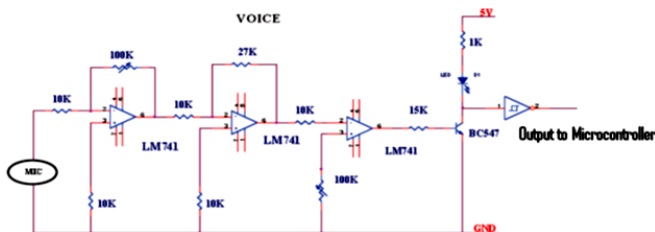


Figure 6. Circuit diagram for voice IC

6. Smart Card Reader

When the power is switched on it will display smart card on the terminal. This indicates that the smartcard reader is ready to work. After getting this display message on the terminal if you insert a smartcard green led(ln2) will be glowing .It will check whether it is inserted properly or not. If not, it will display the error

message like “Please insert the card properly”. If you have inserted the card properly it will prompt you to enter password which is called as security code.

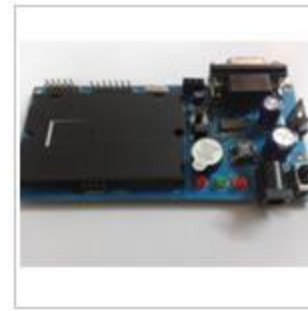


Figure 7. Smart Card Reader

7. RFID Reader

The RFID reader reads EM4100 family transponder tags that are brought in proximity to the reader and output the unique tag identification number through RS232 serial port at 9600 bps. The reader output 12 byte including one start, stop byte and 10 unique data byte. The start byte and stop byte are used to easily identify that a correct string has been received from the reader. The middle ten bytes are the actual tag's unique ID. Vertical and horizontal parity checking has been done in card reading algorithm to ensure data integrity. One status LED is provided to indicate card detection.



Figure 8. RFID Reader

III. RESULTS AND DISCUSSION

ADVANTAGES

- Automatic billing
- Use RFID TAG for billing
- Staffs are not required for billing

- Product is little expensive but overall
- expenses is low
- Easy to locate/track the product
- It is easy to get the product information
- and no extra time needed.
- LCD display is present which shows the
- updated bill, every time the shopper
- adds or removes any object from the cart.

IV.CONCLUSION

The introduction of this electronic product to the supermarkets will be a boon for shopping as it would make shopping easier. Now, the customer needs not to stand in a queue to pay the bill. This product makes billing automatic. The inspiration and idea of this paper was drawn from large queues at the shopping mall and the inconvenience that it causes to the costumers. This new system of billing is fast as the single product detail gets recorded as it is dropped into the trolley. Working on this product it was noted that RFID technology and ZIGBEE has a very vast applications in the near future. Also, RFID is better and faster than bar code reading because the later works on line of sight which is not the case for RFID technique. RFID technology is compact and reliable. ZIGBEE is the wireless network that connects the costumer to the retailer and is very secure with long range of operation. This intelligent shopping system can completely change the way of shopping. The RFID and The introduction of this electronic product to the supermarkets will be a boon for shopping as it would make shopping easier. Now, the customer needs not to stand in a queue to pay the bill. This product makes billing automatic. The inspiration and idea of this paper was drawn from large queues at the shopping mall and the inconvenience that it causes to the costumers. This new system of billing is fast as the single product detail gets recorded as it is dropped into the trolley. Working on this product it was noted that RFID technology and ZIGBEE has a very vast applications in the near future. Also, RFID is better and faster than bar code reading because the later works on line of sight which is not the case for RFID technique. RFID technology is compact and reliable. ZIGBEE is the wireless network that connects the costumer to the retailer and is very secure with long range of operation. This intelligent shopping system can completely change the way of shopping. The RFID and ZIGBEE technologies that are not commonly used would definitely find some use commercially. Moreover, this

smart trolley will be very beneficial as it would reduce the number of salesmen and billing counters and also prove to be time saver for both costumer and the shopkeeper. ZIGBEE technologies that are not commonly used would definitely find some use commercially. Moreover, this smart trolley will be very beneficial as it would reduce the number of salesmen and billing counters and also prove to be time saver for both costumer and the shopkeeper.

V. REFERENCES

- [1]. Dr. P. Muthu Kannan, Anupriya Asthana, "Automatic Retail System Using RFID", Volume 1, Issue 5, October 2013, International Journal of Advance Research in Computer Science and Management. Studies.
- [2]. EktaMaini, JyotiSheltar, "Wireless Intelligent Billing Trolley for malls", International Journal of Scientific Engineering & Technology volume No.3 Issue No. 9, 1175-1178. 1 sept 2014.
- [3]. The Most Widely Used Computer on a Chip: The TMS 1000. New Haven and New York: Ticknor & Fields. Retrieved 2009-12-23.
- [4]. Satish Kamble, Sachin Meshram, Rahul Thokal, Roshan Gakre, Developing a Multitasking Shopping Trolley Based On RFID Technology, International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-3, Issue-6, January 2014.
- [5]. D.V.S Chandra Babu, "wireless intelligent billing trolley for supermarket", International Journal of Advanced Research in Technology, vol.3, issue 1, Aug. 2012.
- [6]. Chihhsiong Shih, Bwo-cheng Liang and Cheng-zu Lin, "An Automatic Smart Shopping Cart Deployment Framework based on Pattern Design", IEEE 15th International Symposium on Consumer Electronics, 2011.