© 2017 IJSRST | Volume 3 | Issue 2 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X

National Conference on Advances in Engineering and Applied Science (NCAEAS)
16th February 2017
In association with
International Journal of Scientific Research in Science and Technology

RFID Based Smart Shopping Trolley with IR Sensor

Shivani Titarmare , Monali Thakre , Rasika Shingote, Sakshi Shukla, Vikram Deshmukh

Department of Electronics and Telecommunication, Smt. Rajshree Mulak Collage of Engineering For Womens , Nagpur, Maharashtra, India

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 to our system. As customer buy the next 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 AT89S52 , RFID Tags , Barcode Scanner , Liquid Crystal display.

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 long time.

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.

II. METHODS AND MATERIAL

1. Block Diagram

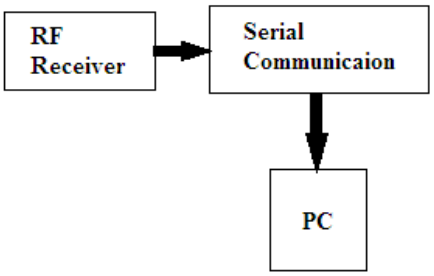

Figure 1. Block Diagram of Server Section

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. 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. Then it displays on LCD. The item details like name, cost & total bill of items inserted in trolley are displayed on LCD.

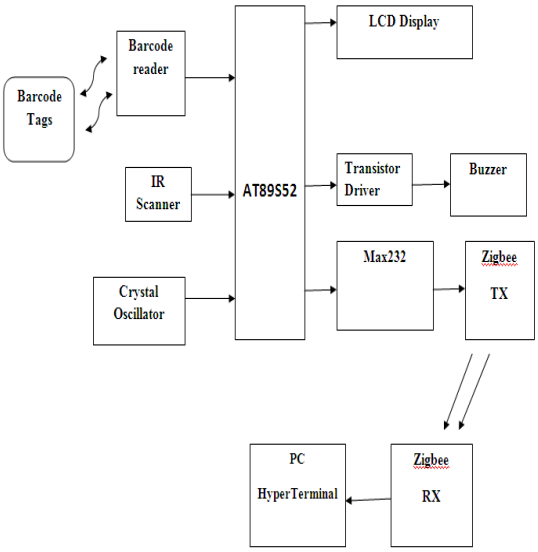

Figure 2. Block Diagram

A. When person puts an item in the trolley, its code will be detected by BARCODE Scanner which is interfaced with processor. BARCODE Scanner isinterfaced serially with nRF24L01. 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.

2. Hardware Design

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 RS232 level output suitable for interfacing with microcontrollers or host PC serial port

Figure 2. 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 sensitive to IR light of the same wavelength as that emitted by the IR LED.

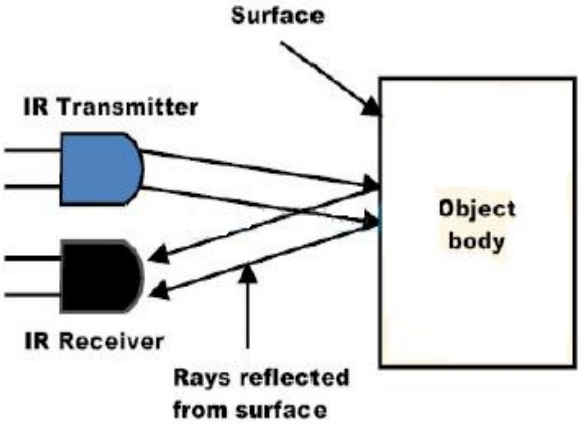

Figure 2. IR sensor

C.AT89S52

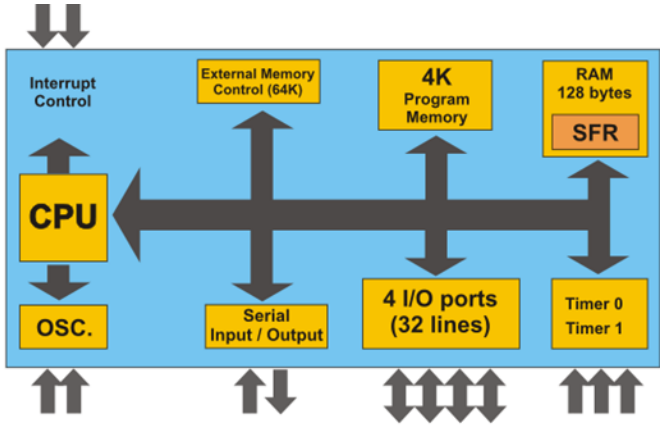

Figure 3. Microcontroller Internal Structure

The AT89S52 is low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of the in-system programmable Flash memory. The device is manufactured with using Atmel's high-density nonvolatile memory technology and is compatible with industry- standard 80C51 instruction set, protocol and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and is cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, the Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and the clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and also supports two software selectable for the power saving modes.

D. Liquid Crystal Display

A liquid crystal display (LCD) is a flat, thin display device made up of any number of monochrome pixels or color arrayed in front of a reflector or light source. Each pixel consists of a column of liquid crystal molecules suspended between two polarizing filers, and two transparent electrode. the polarization of light is twisted by liquid crystal entering one filter to allow it to pass through the other. 'Smart LCD' display to output visual information is used by many microcontroller devices. They have a standard ASCII mathematical symbols and set of characters. For an 8-bit data bus, the display requires 11 I/O lines and +5V supply. For a 4-bit data bus it only requires the seven extra lines and supply lines. When the LCD display is disabled and they do not interfere with the operation of the microcontroller. Data can be placed at any location on the LCD.

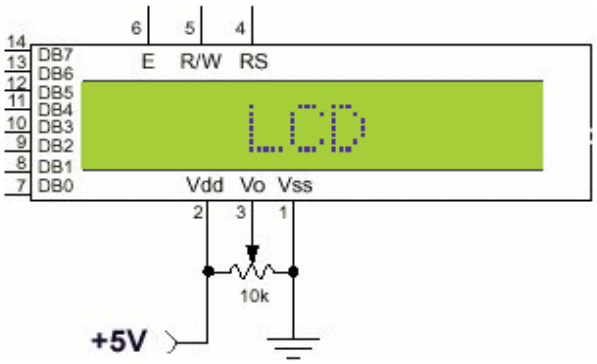

Figure 4. Liquid crystal display

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 minimal power and provide reliable delivery of data between devices. The modules functions within the ISM 2.4 GHz frequency band and are pin-for-pin compatible with each other.

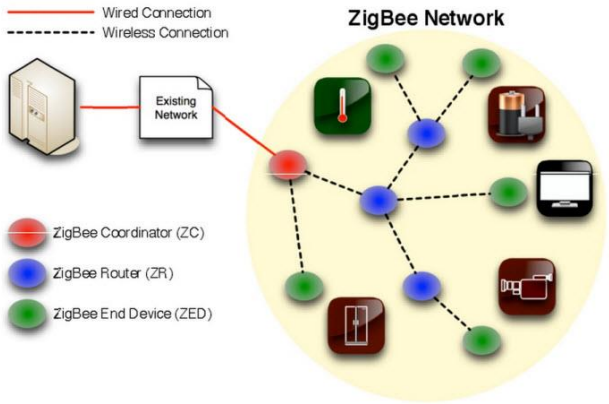

Figure 5. Zigbee network

Key Features:

- Gives 100mW output power
- It has Long range: 4000 feet
- Provides Miniature footprint: 0.9" x 1.63"
- Integrated PCB F antenna or UFL connector for external antenna
- Has Worldwide acceptance: FCC, IC and CE
- Consist Powerful Texas Instruments 256k MSP430 with 802.15.4 MAC or ZigBee Stack
- Consits of LSR serial interface based on 802.15.4 MAC
- Supports Low power operation .
- RoHS compliant
- Streamlined development with LSR design services.

- License options are available to purchase design or integrate design.

F. Max232

The MAX232 device is a dual driver or receiver that includes a capacitive voltage generator to supply. TIA or EIA-232-F voltage levels from a single 5-V Power Supply. Each receiver converts TIA or EIA-232-F inputs 1.0-µF to 5-V, TTL/CMOS levels. These receivers have a typical threshold of 1.3 V, a typical hysteresis of 0.5 V, and can accept ±30-V inputs. Each driver converts TTL or CMOS input levels into TIA 3 Description.

Features:

- Meets or Exceeds TIA/EIA-232-F and ITU
- Operates up to 120 kbit/s
- Two Drivers and Two Receivers
- ±30-V Input Levels
- Low Supply Current: 8 mA Typical
- Upgrade With Improved ESD (15-kV HBM) and

MAX232x PDIP

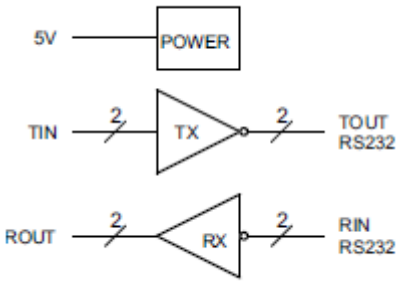

Figure 6. Systematic Schematics of Max 232

IV. ALGORITHM

Step 1. Allotment of trolley
Step 2. Initialize the System
Step 3. Search for RFID on product
Step 4. Check the RFID tag
Step 5. If the tag is registered, read related data from memory of micro-controller.
Step 6. Display data on LCD
Step 7. Add item cost as items are added in trolley.
Step 8. Displays total cost of items in trolley
Step 9. Step 9: When upload key is pressed send data to the counter.
Step 10: Print the Bill
Step 11: Stop

III. RESULTS AND DISCUSSION

The utility of trolley will be first for its commercial use. This device records the data of the different products with the help of suitable sensors like RFID Tags and IR sensor. This recorded data helps the shop owner with detailed analysis of shopping by the customer & their preferences through the computer software, Printout of the same can be obtained. In smart trolley, there is no need to wait in billing queue and no need of thinking about budget during payment of bill. It gives number of products in trolley and total cost of the products on the spot. Theft detection is also a key feature of smart shopping trolley by using IR sensor.

IV. CONCLUSION

The developed product is easy to economical, use and do not require any special training. This project simplifies billing process, makes it swift and increases the security using RFID technique. This takes the overall shopping experience to a different level. A scheme for automated retail shop based on RFID is introduced in this paper. The RFID technology is the most promising technology for identification and tracking purpose and it is an excellent option for deployment in enterprise applications like retail stores, supply chain management etc. Require the correct orientation toward the reader to be read and any damage makes them unreadable. Moreover using barcodes is a human-intensive activity at the point of sales. Hence RFID technology is the better approach to overcome these shortcomings.

V. REFERENCES

[1]. "ZBar bar code reader," http://zbar.sourceforge.net, retrieved: July 2, 2013].
[2]. H.Karl and A.Willig, "Protocols and Architectures for Wireless Sensor Networks," Chichester, England, 2005.
[3]. J.Awati and S.Awati, "Smart Trolley in Mega Mall," vol.2, Mar 2012.

[4]. Longfei Shang guan, Zhenjiang Li, Zheng Yang, Mo Li, Yunhao Liu, Senior , and Jinsong Han, OTrack: Towards Order Tracking for Tags in Mobile RFID Systems, IEEE Transactions on Parallel and Distributed Systems, Vol. 25, No. 8, August 2014.

[5]. L. Xie, B. Sheng, C.C. Tan, H. Han, Q. Li, and D. Chen, ‘‘Efficient Tag Identification in Mobile RFID Systems,’’ in Proc. IEEE INFOCOM, 2010, pp. 1-9.

[6]. W. Sun and Y. Yuan, Optimization Theory and Methods: Nonlinear Programming, 1st ed., New York, NY, USA: Springer-Verlag, 2010.

[7]. AeroAssist, "RFID in Aviation: airport luggage control," AeroAssist.pt, Jun. 2008.

[8]. B. Sheng, C.C. Tan, Q. Li, and W. Mao, ‘‘Finding Popular Categories for RFID Tags,’’ in Proc. MobiHoc, 2008, pp. 159-168

[9]. C.C. Tan, S. Bo, and Q. Li, ‘‘How to Monitor for Missing RFID Tags,’’ in Proc. ICDCS, 2008, pp 295-302.