Abstract—Universal Serial Bus has grown to become a common interface in many embedded industrial, medical, automotive, and consumer applications. Microchip’s USB solutions are designed to support the growing needs of these markets with a full complement of robust, highly integrated USB PIC and DSPIC DSCs, and USB Hubs and Devices. Disability is the state of a person in which one has to depend on others for their own needs. Blindness is one of the disabilities of a human being. At the present date, various methodologies have been developed to improved life style of blind people. Still purchasing products in the supermarket without others support is tricky one for them. This system provides the guideline for them to identify and purchase their products in the supermarket. Barcode technology is used to identify the products. The audio instructions will guide them inside the supermarket on the real time based. To make the supermarket in a smarter way the billing system is automated. The autonomous billing system uses zigbee transceiver to transmit/receive the product information. The aim of this system is to reduce others support for blind people in shopping and provide them A good quality living environment. So, to avoid headache like pulling trolley, waiting in billing queue, guide the blind people. We are introducing new concept that is “ELECTRONIC SHOPPING CART FACILITY FOR BLIND PEOPLE USING USB Firmware.”

Keywords—Barcode Scanner, PICDEM Full-Speed USB Kit, Zigbee Technology, Optical sensor.

I. INTRODUCTION

In this smart world, no one can end up the day without using any kind of embedded products. It makes our human life very smarter and to feel comfortable. Lot of electronic products are introduced for visually impaired but all having some sort of drawbacks such as complexity in operation, need of more practice, higher cost, expensive design methodology and installation, non optimized data, more time consuming and tough maintenance. World Health Organization (WHO) in 2012, 285 million people are visually challenged in the world. Among them 39 million people are blind and 246 million having low power vision. About 90% of them are living in developing countries. At present in the case of shopping there is no such embedded product. Shopping is one of the interesting things for every human, but this simple task cannot be easily achieved flow less because customer has to wait for billing procedure. The goal of every product is nothing but to attain the top position in the market. For that, the product should have some basic qualities such as low cost, portability, easy working and maintenance. So the proposed system is effectively designed by considering these aspects in mind. To provide the low cost and efficient embedded product, PIC microcontroller is preferred. Scanner technology and PIC microcontrollers are coordinately used to design the system. It can be easily implemented in the supermarkets where all kind of things available under one roof.

At transmitting side, the system uses a barcode scanner and APR6016. Barcode scanners begin by illuminating the code with red light. The sensor of the barcode scanner detects the reflected light from the illumination system and generates an analog signal with varying voltage that represents the intensity of the reflection. APR6016 offers non-volatile storage of voice and data in advanced Multi-Level Flash memory. Up to 16 minutes of audio recording and playback can be accommodated. A maximum of 30K bits of digital data can be stored. The system using two Zigbee transceiver modules, one interfaced with microcontroller and the other one connected with PIC18F4550 Full-Speed USB module. Wireless techniques are implemented to determine and transmit the product information automatically. At the receiver side, the system use USB Communication Device Class (CDC) specification. The Microsoft Windows driver conforms to this specification. Therefore, the embedded device must also be designed to conform with this specification in order to utilize this existing Windows driver. So, systems easily connect through USB port with PC. An advantage of this method is the PC application will see the USB connection as an RS-232 COM connection and thus, require no changes to the existing software.
II. BLOCK DIAGRAM

2.1 Transmitter

As per denoted in Figure 1, bar code scanner and RFID interface with microcontroller through serial communication protocol. Here multiplexer is required because barcode and RFID both use same receiver and transmitter pin. The APR6016 offers non-volatile storage of voice and data in advanced Multi-Level Flash memory. RFID is used for conveying the product information and guide the path for shopping to visually impaired people through audio instruction. APR6016 is connected with speaker which provides high quality and low noise audio signal. Zigbee is a communication to transmit and receive the information between two nodes. When purchased item scanned by blind people, this particular product detail transmitted through Zigbee. Here RFID generally used for guiding path and identify the product through speaker.

2.2 Receiver

As Shown in Figure 2, Purchased items for predefined customers are receive by Zigbee module and display on PC. Here, the system uses Microchip USB firmware. So receiving module directly interface with PC via USB cable.

2.3 Methodology

Optical Sensor:- In this paper we have adopted the Obstacle Detection methodology. It is used to keep predefined path for trolley. If obstacle is far away from sensor, it does not give reflected back signal and if obstacle is in range of sensor then it will get the reflected signal then obstacle is detected.

Barcode Scanner:- A barcode is an optical machine-readable representation of data, which shows certain data on certain products like unique ID. Purpose of using barcode 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 source & CCD capture) and decoder circuit which takes raw data of barcode and outputs serial data at 9600 bps with RS232 level output suitable for interfacing with microcontrollers or PC serial port.

RFID:- The basic RFID system consists of two main components, the small transponder, more commonly known as a tag, which is attached to the item needing identification and the interrogator, or reader, which in some cases is used to both power the tag and read its data without contact.

The tag is known as a passive transponder if it is unable to function without the reader since the reader supplies the power to it. If the tag has its own power supply such as a battery, then it is an active transponder.
Note that reader is somewhat of a misnomer as the device in some cases can actually be used to write to the tag to change its data as well as reading from it.

III. HARDWARE DESIGN

3.1 Development Board

The PICDEM™ PIC18 Explorer Demonstration Board is the latest demonstration board for evaluating Microchip Technology’s PIC18FXXXX and PIC18FXXJXX families of devices. The board contains 18F series IC. The board can be used as a stand-alone device or with an in-circuit debugger, such as the MPLAB® ICD 2, and host PC. Free software development tools are available for application development and debugging.

PIC18F4550 is a High-Performance, Enhanced Flash and USB microcontrollers with nano Watt Technology. This family of devices offers the advantages of all PIC18 microcontrollers, high computational performance at an economical price—with the addition of high endurance, Enhanced Flash program memory.

3.2 Zigbee

In addition to these features, the PIC18F2455/2550/4455/4550 family introduces design enhancements that make these microcontrollers a logical choice for many high-performances, power sensitive applications.

The Zigbee-PRO RF Modules was engineered to meet IEEE 802.15.4 standards and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between devices.
The modules operate within the ISM 2.4 GHz frequency band and are pin-for-pin compatible with each other.

**Key Features:**
- Indoor/Urban: up to 300’ (90 m), 200’ (60 m) for International-variant.
- Transmit Power: 63mW (18dBm), 10mW (10dBm) for International-variant.
- TX Peak Current: 250mA (150mA for international variant).
- RX Current: 55 mA (3.3 V).

3.3 APR6016

APR6016 devices can be cascaded for longer duration recording or greater digital storage. Device control is accomplished through an industry standard SPI interface that allows a microcontroller to manage message recording and playback. This flexible arrangement allows for the widest variety of messaging options. The APR6016 is ideal for use in cellular and cordless phones, telephone answering devices, personal digital assistants, personal voice encoders and voice pagers. APR6016 device to reproduce audio signals in their natural form, eliminating the need for encoding and compression which can introduce distortion.

IV. SOFTWARE DESIGN

4.1 MPLAB IDE

MPLAB IDE is a Windows OS based Integrated Development Environment for the PICmicro MCU families and the dsPIC Digital Signal Controllers. The MPLAB IDE provides the ability to:
1. Create and edit source code using the built-in editor.
2. Assemble, compile and link source code.
3. Debug the executable logic by watching program flow with the built-in simulator or in real time with in-circuit emulators or in-circuit debuggers.
4. Make timing measurements with the simulator or emulator.
5. View variables in Watch windows.
6. Program firmware into devices with device programmers

4.2 C18 C COMPILER

MPLAB C18 C Compiler is a cross-compiler that runs on a PC and produces code that can be executed by the Microchip PIC18XXX family of microcontrollers. Like an assembler, the MPLAB C18 compiler translates human-understandable statements into ones and zeros for the microcontroller to execute. Unlike an assembler, the compiler does not do a one-to-one translation of machine mnemonics into machine code.

MPLAB C18 takes standard C statements, such as “if(x==y)” and “temp=0x27”, and converts them into PIC18XXX machine code. The compiler incorporates a good deal of intelligence in this process. It can optimize code using routines that were employed on one C function to be used by other C functions. The compiler can rearrange code, eliminate code that will never be executed, share common code fragments among multiple functions, and can identify data and registers that are used inefficiently, optimizing their access.

4.3 MCHPFSUSB Firmware

The Microchip USB Firmware Framework is a library that can be used to create new USB applications. The USB Framework is based on the latest versions (as this is written) of Microchip development tools. Microchip’s current PIC18 USB microcontroller families share the same basic set of USB registers and names. As a result, the MCHPFSUSB Framework can be ported to work with the different PIC18 USB microcontroller families with little to no modification.

4.4 RS 232 Emulation over USB

This figure shows the migration path from RS-232 to USB. The UART physical layer is replaced with the USB hardware layer. Since CDC is a standard USB class, Microsoft has implemented a driver which supports the RS-232 interface emulation. On the PC side, the CDC driver provides the linking layer between the USB hardware and the UART driver. This allows the end application to remain unchanged because from its perspective, it still sees the RS232 interface. As for the embedded application side; the PIC18F4550 has a full-speed USB peripheral. In addition, Microchip also provides the CDC RS-232 Emulation Reference Project which provides necessary application programming interfaces.
**V. CONCLUSION AND FUTURE SCOPE**

All computers have several USB ports, so USB is much more convenient for users. No work or modification is required on the PC side to implement the RS-232 emulation over USB. This is so because Windows 2000 and XP already come with a driver which provides the RS-232 emulation capability as defined in the Communication Device Class Specification. Therefore the only things left to do are for the embedded device to have the hardware and firmware supports that Conform to the CDC specification.

In Automatic trolley, there is no need to pull heavy trolley, no need to wait in billing queue and no need of thinking about budget. The microcontroller based trolley automatically follows the customer. Also it maintains safe distance between customer and itself.

It gives number of products in trolley and total cost of the products on the spot. It gives facilities like trolley stopping, turning right or left. So, we could successfully implement the concept of Automatic trolley.

The Microchip TCP/IP Stack is a suite of programs that provides services to standard TCP/IP-based applications (HTTP Server, Mail Client, etc.), or can be used in a custom TCP/IP-based application. So using this application we can also maintain online database for selling products.

**REFERENCES**


