Portable Camera Based Information Reading of handheld Packaged product for Blind Person: Evaluation

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ABSTRACT: It is very difficult to recognize the hand held packaged product for blind person. With the help of sensation and smelling blind person can easily identify the material like sugar, salt etc. but now a day contents or materials are packed in packet so, packaged products are very difficult to understand. In this project we are dealing with this drawback and find out packed product name and also information of packaged product.

KEYWORDS: Blindness, Blind person, packaged products, information reading.

I. INTRODUCTION

With the survey of world health organization in 2014-15 285 million people are visually impaired worldwide from this 39 million are totally blind and 246 millions have low vision. From this 90% of people having no income source and 82 % of blind person having aged is above 50 [1] [2].

In day to day life there is almost product which contains packaging like hand held package product, medicine bottles, etc. today, there are already a few systems which read the information or text on the product but in this most of system read only the text of the product. For example, portable bar code readers designed to help blind people identify. But in this promises blind person read only charter on that product not the detailed information like why it used? Why it eating? Like that. So the project gives all information about that product, medicine bottles etc

II. LITERATURE SURVEY

Today, there are already a few systems that have some promise for portable use, but they cannot handle product labelling.

A. Existing System

a. Braille lippy bar code stickers which sticks on portable hand held packaged product but which is very expensive because of this every packaged product which you have to sticks Braille lippy code stickers and it not possible.[3]

b. Portable bar code readers designed to help blind people identify different products in an extensive product database can enable users who are blind to access Information about these products through Speech and Braille. [4] But a big limitation is that it is very hard for blind users to find the position of the bar code and to correctly point the bar code reader at the bar code. Some reading assistive systems such as pen scanners might be employed in these and similar situations. Such systems integrate OCR software to offer the function of scanning and recognition of text and some have integrated voice output.

However, these systems are generally designed for and perform best with document images with simple backgrounds, standard fonts, a small range of font sizes, and well-organized characters rather than commercial product boxes with multiple decorative patterns. Most state-of-the-art OCR software cannot directly handle scene images with complex backgrounds [7].

c. Pen Scanner for blind person but it having same drawback like optical character bar code reader i.e. blind person not exact pointing it have complication.[5]

d. A number of portable reading assistants have been designed specifically for the visually impaired "K-Reader Mobile" runs on a cell phone and allows the user to read mail, receipts, fliers, and many other documents. However, the document to be read must be nearly flat, placed on a clear, dark surface (i.e., a non-cluttered background), and contain

mostly text. In addition, "K-Reader Mobile" accurately reads black print on a white background, but has problems recognizing colure text or text on a colour background. It cannot read text with complex backgrounds. Furthermore, these systems require a blind user to manually localize areas of interest and text regions on the objects in most cases. [5]

e. Portable Camera-Based Product Label Reading For Blind People is camera-based assistive text reading framework to help blind persons read text labels[8][9] and product packaged from hand-held objects in their daily life but this system have limitation only read the text on the product not gives total information of that product. A number of portable reading assistants have been designed specifically for the visually impaired [10][11]

f. To Identify the objects by using camera and is given to mat lab for image processing in Mat lab images will be detected thereby after recognizing particular thing data is given to ARM 7 processor which is interfaced with speaker so that after identification is done the product name is given to blind person through voice but it have limited range.

III. PROPOSED SYSTEM

 Here in project we modified with the existing system. In this we used LPC 2148 ARM based microcontroller which is interfacing with the LCD and MAX 232 IC and also instead of VOICE IC 9600 we used android application which used in android mobile. Because of this blind person can use this system at specific distance and read the information of packaging product.

Fig1. Top View of proposed system

Fig1 show transmitter unit which consists of three parts i.e. camera, packaged product and personal computer or laptop. Initially in transmitting section camera captured the image of package product with the help mat lab software which installed in personal computer or laptop and that captured image is saved in the database of a laptop or personal computer we called trained image and again we captured the image of same packaged product which used initially called as test image. If comparison of images is matches you have to write product name in message box.

Fig 2 show receiver unit consist of power supply, Microcontroller kit based on ARM LPC 2148, LCD, Android mobile device with android application and earphone.

If character what you have type in message box of mat lab that compare with microprocessor if it matches correctly android mobile consist of android application gives voice announcement through speaker or blind person hear information through earphone also Product name display on LCD which is interfacing with Microcontroller LPC 2148
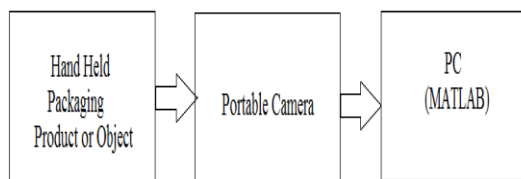

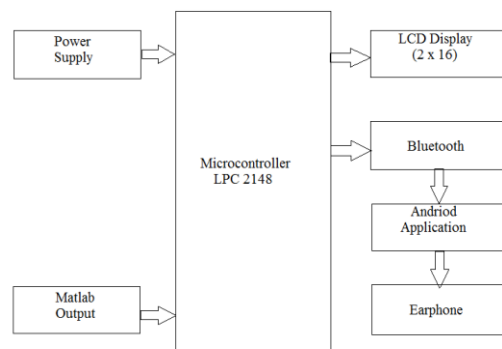Fig 2 Block diagram of transmitter Unit

Fig 3 Block diagram of receiver Unit

IV. HARDWARE USED

A. Microcontroller Circuit (LPC2148)

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer. 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory.128 bit wide interface/accelerator enables high speed 60 MHz operation. One or two (LPC2141/2 vs. LPC2144/6/8) 10-bit A/D converters provide a total of 6/14analog inputs, with conversion times as low as 2.44 us per channel [11].

B.MAX232

Fig.4 shows interfacing of MAX 232 with microcontroller in figure microcontroller can communicate with the serial devices using its single Serial Port. The logic levels at which this serial port operates is TTL logics. But some of the serial devices operate at RS 232 Logic levels. For example PC and GSM etc. So in order to communicate the Microcontroller with either GSM modem or PC, a mismatch between the Logic levels occurs. In order to avoid this mismatch, in other words to match the Logic levels, a Serial driver is used. And MAX 232 is a Serial Line Driver used to establish communication between microcontroller and PC (or GSM).
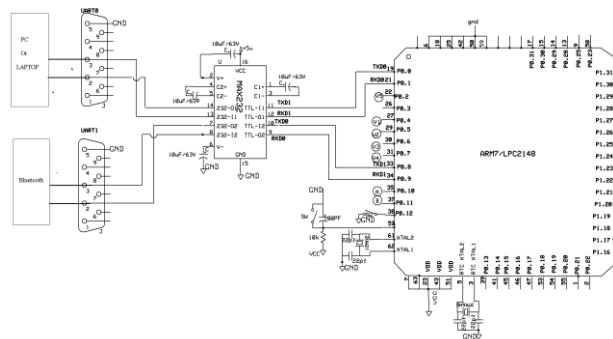

Fig.4 Interfacing Of LPC2148 with MAX232

C. Liquid Crystal Display (16x2)

Fig 4 shows LCD. Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. A liquid crystal display (LCD) is a flat panel display that uses the light modulating properties of liquid crystals (LCs). Fig. 5 shows how to interface the LCD to microcontroller.
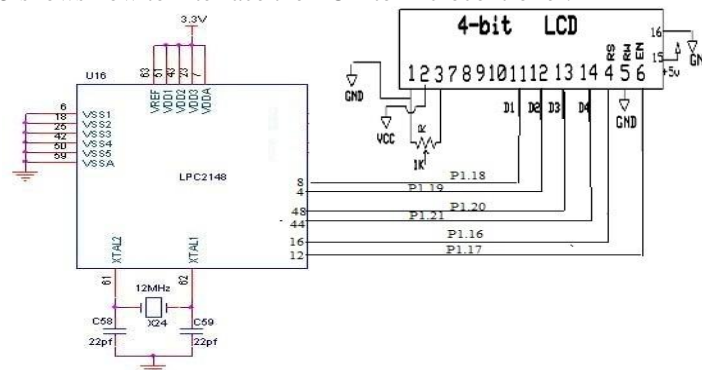

Fig.5 Interfacing of LPC 2148 and LCD

The 2x16 character LCD interface card with supports both modes 4-bit and 8-bit interface, and also facility to adjust contrast through trim pot. In 4-bit interface 7 lines needed to create 4-bit interface; 4 data bits (D0 – D3), three control lines, address bit (RS), read/write bit (R/W) and control signal (E). The ARM7 LPC2148 Primer board has seven numbers of LCD connections are needed to create 4-bit interface; connected with 4 data bits (P0.19 – P0.22, D4-D7), address bit (RS-P0.16), read/write bit (R/W-P0.17) and control signal (E-P0.18) to make LCD display [12].

D. Bluetooth Module

Bluetooth is a wireless technology used to transfer data between different electronic devices. The distance of data transmission is small in comparison to other modes of wireless communication. This technology eradicates the use of cords, cables, adapters and permits the electronic devices to communicate wirelessly among each other.

Fig 6 shows the interfacing of Bluetooth with microcontroller. We now want to transmit & receive the data from host system to LPC2148 Primer Board by using Bluetooth module through UART0. The serial data is taken from or sent to the host system by using Bluetooth module through MAX232 into the SBUF register of LPC2148 microcontroller (refer serial interfacing with LPC2148).[13]

E. Interface UART0 and UATR1

Fig. 5 and Fig 6 show how to interface the UART0 and UART1 to microcontroller. To communicate over UART or USART, we just need three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground). So to interface UART with LPC2148, we just need the basic signals.

Display a text in PC using LPC2148 Primer Board through UART module. In LPC2148 Primer Board contains two serial interfaces that are UART0 & UART1. Here we are using UART0. The Transmitter pins send the data into PC and the receiver pin receives the data from PC. The PC and microcontroller speed are denoted by using baud rate. When the baud rates of both PC and Microcontroller are same, then only the data transmit and receive correctly otherwise not. Same as for the UART 1which is related to Bluetooth.[12]
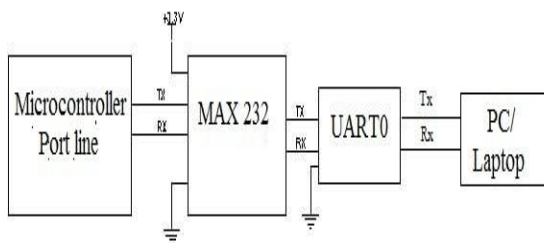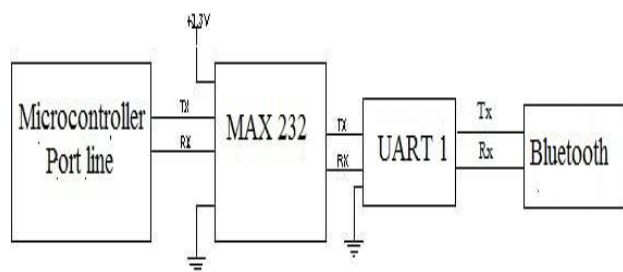
Fig.6 Interface UART0   Fig.7 Interface UART1

V. SOFTWARE USED

A. Keil µ version 3.0

Keil development tool for the microcontroller architecture support every level of software development from the professional application engineer to the learning for about embedded software development.

The keil µ version debugging accurate simulates on chip peripheral on LPC2148 microcontroller. Simulation help to understand hardware configuration and avoid time wasted on setup problem.

B. Flash Magic

Flash Magic is a tool which used to dump the hex code in EEPROM of micro-controller from PC. It is a freeware tool. It only supports the micro-controller of Philips and NXP. You can burn a hex code into that controller which supports ISP (in system programming) feature. To check whether your micro-controller supports ISP or not take look at its datasheet. So if your device supports ISP then you can easily burn a hex code into EEPROM of your device.

The flash memory in system program is a tool that run under window .It allow in circuit programming of FLASH memory via a serial RS 232 link. Computer side software called a flash magic is executed that accept the Intel HEX format file generated from compiler keil to be send to target microcontroller. It detects the hardware connected to serial port.

C. MATLAB (Used for create m file)

MATLAB is widely used in all areas of applied mathematics, in education and research at universities, and in the industry. MATLAB stands for MATrix LABoratory and the software is built up around vectors and matrices. MATLAB also has some tool boxes useful for signal processing, image processing, optimization, etc.

We created m file in mat lab for image processing when we run m file in mat lab which just compare the images and gives output.

D. Android development tool (Eclipse)

We can develop android application with the help of eclipse. In computer programming, Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Eclipse is written mostly in Java and its primary use is for developing Java applications. ADT extends the capabilities of Eclipse to let developers set up new Android projects, create an application UI, add packages based on the Android Framework API, debug their applications using the Android SDK tools, and export signed (or unsigned) .apk files in order to distribute their applications. It is free download.

VI. WORKING AND RESULT ANALYSIS

The system framework consists of three functional components they are:
* Scene Capture
* Data Processing and
* Audio Output

Fig.8 System overview with its three function

Scene captured Unit: The first step image capturing in this image capturing process involves several processing steps. First the analog video signal is digitized by an analog-to-digital converter to produce a raw, digital data stream.

In second composite video, the luminance and chrominance are then separated. Next, the chrominance is demodulated to produce color difference video data. At this point, the data may be modified so as to adjust brightness, contrast, saturation and hue. Finally, the data is transformed by a color space converter to generate data in conformance with any of several color space standards, such as RGB and YCbCr. Together, these steps constituted video decoding, because they "decode" an analog video format such as NTSC or PAL. Simply in scene captured unit just captured image of packaged product.

Data processing Unit: In data processing unit basically depends on mat lab and ARM 7 based LPC 2148 kit. In mat lab we just compared image which capture in scene unit if matches output of mat lab is fed to the ARM7 based LPC 2148 kit. Project will use ARM7 TDMI-S based NXP's (national semiconductors and Philips) LPC 2148 microcontroller in LQFP (Liquid Quad Flat package) with 64 pins. The Power requirement of LPC2148 Microcontroller is 3.3VDC and VSS ground.

In this project we required operating voltage for ARM controller board is 12V. Hence the 12V D.C. power supply is needed for the ARM board. This regulated 12V is generated by stepping down the voltage from 230V to 18V now the

step downed a.c voltage is being rectified by the Bridge Rectifier using 1N4007 diodes. The rectified a.c voltage is now filtered using a 'C' filter. Now the rectified, filtered D.C. voltage is fed to the Voltage Regulator. This voltage regulator provides allows us to have a Regulated constant Voltage which is of +12V. The rectified; filtered and regulated voltage is again filtered for ripples using an electrolytic capacitor 100μF.

LCD is connected to P1.16 to P1.21.

BLUETOOTH is connected to UART1

PC is connected to UART0.

Audio output Unit: In audio output unit user gives voice announcement. The information obtained from mat lab is given to Bluetooth module by microcontroller and this is transferred to Bluetooth inbuilt android mobile. The corresponding information or application related to the tag is opened in the android mobile. The image and the text related to that thing is displayed in the mobile and also voice announcement of the same text will be announced from the android mobile. User can know information by connecting earphones to mobile device also.

VII. CONCLUSION AND FEATURE WORK

The main aim of this project is to design a system for blind persons to recognize the hand held packaging objects or products .we design it with the help of microcontroller and android application and find products or objects information with voice announcements.

Our feature work we instead of Bluetooth we used the wifi because of this several users can connected and help to read the information of the product. Now our system is real time based. Means it gives 5 ms delay but we removed that delay it automatically captured the image. And also we used wireless camera.

VIII. ADVANTAGES

A. It removes physical hardware requirement.
B. It is less expensive and Portability.
C. Accuracy and Flexibility.
D. Automatic Voice detection.

IX. APPLICATION

A. It is very useful in blind person school.
B. It is useful in pharmacy for blind person also for normal person.

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