International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 04 | Apr-2016 www.irjet.net p-ISSN: 2395-0072

FPGA BASED BRAILLE TO TEXT AND SPEECH FOR BLIND PERSON

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ABSTRACT

Visually impaired peoples use braille system for reading and writing. This people are not able to operate computers and other educational software due to this they unable to improve their knowledge. They are comparatively weak than people with clear vision which causes adverse effect on the economic society. One way to improve their knowledge is by introducing a system which can convert braille to word and audio which will improve them them to communicate freely with outside world. This system presents the implementation of braille to word and audio converter which is output and word of that particular input. Braille keypad with different combination of six cells are used an input to system. In this system FPGA kit is used to convert this input to English text and also display it on LCD after decoding English text it converted to audio.

I. INTRODUCTION

The raised dot system now known as Braille. It was established by a Frenchman Louis Braille in 1824. Louis had found 63 ways to used six dot cells in an area no larger than a fingerprint. It took2 years after his death to adopt as official communicating language for blind person. Today Braille is used throughout the world and is taught the children from early age. Braille is used for reading and writing. The person who read braille will fill the dots under their fingerprint. Braille letters are made up of six raised dots arrange in group called a cells. Like one half of domino. Each letters of alphabets is made up of different combination of these six dots. Which make up word. Blindness is considered to be highest among all other disabilities. More than 15 million people in India are blind. Blind people faced tremendous difficulties in accessing information from document. Thus in order to build communication gap between blind person and community's Braille system is used. Blind people are very important part of the society. Due to their disabilities they have less access to new technologies like computers and internet. Overtime Braille system has been used by blind people for written communication. Different patterns of raised dots are inscribing characters on paper for writing. Blind people can read this by touching the dot instead of vision. It is the way for blind people can acquire knowledge and particular in an educated culture.Braillews first developed in the nineteenth century and become leading tactical alphabet. Its characters are six-dot cells, two wide by three tall as shown in fig1.1. Any of the six dots may or may not be raised; giving 64 possible characters. This includes 26 English alphabets ,punctuations, numbers etc.

II. PROBLEM STATEMENT

1.Braille formatting rules are complicated and can be difficult to automatic. Electronic publishing has created a "moving target" as far as the increasing varity of the input formats to be adapted to Braille.

2.Braille to text system had been already introduced and Here we implementing a system for blind which converts Braille language into text and text into speech, which will be easier for blind people.

III. PROPOSED SYSTEM

3.1 System Overview

The proposed system is developed for Blind person application. The block diagram consist of following blocks

1.FPGA(IC XS3s400)
2.16*2 LCD
3.Voice output device(IC ap89010)
4.Speaker

3.2VLSI CHIP FPGA(XILIN SPARTEN 3) :

The Sparten-3 family of Field-Programmable Gate Array is specially designed to meet the needs of high volume, cost-sensitive consumer electronics applications. Here We are using Sparten-3 family for converting Braille language into Text and Text into Speech by using XILINX.

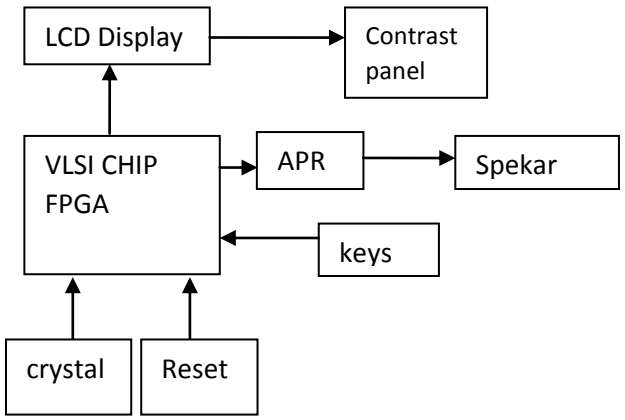

Fig 3.1: Block diagram of system implementation

3.2.1 Voice Output Device

APR89010 can store voice message up to 10 sec with AD PCM with sampling rate 6KHZ. A user selectable option of 8-bit pcm is also available. Different user interface are facilitated by two trigger mode and parallel CPU trigger mode. It is flexible to various devices due to its user selectable trigger. There are combination of voice building blocks to extend playback duration. Number of external components is reduced using 8 bit current mode D/A output and built-in resistor.

APR33A3IC
Sound recording and reproduction is an electrical or mechanical inscription and re-creation of sound waves, such as spoken voice, singing ,instrumental music, or sound effects. The two main classes of sound recording technology are analog recording and digital recording. Acoustic analog recording is achieve by small microphone diaphragm that can detect changes in atmospheric pressure(acoustic sound waes)and record them as graphic representation of sound waves on a medium such as phonograph(in which a stylus senses grooves on a record).Digital recording and reproduction converts the analog sound picked up by the microphone to a digital from by the process of digitization. This lets the audio data be stored and transmitted by wider verity of media. Digital recording stores audio as a series of binary numbers representing samples of the amplitude of the audio signal at equal time intervals, at sample rate high enough to convey all sounds capable of being heard. Digital recordings are considered higher quality than analog recordings mot necessarily because they have higher fidelity(wider frequency response or dynamic range),but because the digital format can prevent much loss of quality found in analog recording due to noise and electromagnetic interference in playback, and nechanical deterioration or damage to the storage medium. A digital audio signal must be reconverted to analog form duringplayback before it is applied to a loudspeaker or earphones.

3.2.2How to Record your voice

1.We can use 8channels(M0-M7)each channel having 1.3minutes recording length.
2.Onboard MIC will automatically be used for recording.
3.Supply voltage:12v AC/DC.
4.Switch on the board power LED(LD1)will on.
5.Put the jumper in the board JP1(REC)section.
6.While record mode is select J5(M0-M7) to select a channel to record the message.
7.Let us assume we want to record message in channel M0,connect M0 to GND(IN Board J3-VCC,GND).
8.Now whatever we speak will be captured by MIC and recorded, status LED(LD2)Will on in record mode indicating that chip is currently recording. Once duration is full the LED(LD2)will off means that segments is full. Now you can disconnect the GND connection from M0,if before the duration is this connection is removed, then that many seconds are recorded and reset duration is kept empty.

3.2.3 How to Playback Record Message

1.Connect the speaker to the board J4 speaker section.
2.Now let us check what we recorded ,remove jumper from JP1(REC)section now connect the M0(J5)to GND(J3)section, status LED(LD2)will on till the recorded sound play in the speaker."This procedure same for the reaming channel also"

3.2.4 How to Use With FPGA

1.Better DO Voice Recording can be done manually.
2.To playback connect controller I/Os to M0 to M7.
3.When output goes low for particular pin Recorded message will paly.

3.2.5 LCD 16*2 character

LCD(liquid crystal display)is an electronic display module and find a wide range of applications. A 16*2 LCD display isvery basic module and is very commonly used in various device and circuits. These module are preferred over seven segment and other multi segment LEDs. The reasons being :LCDs are economical ;easily programmable; have no limitation of displaying special & even custom character(unlike in seven segments),animations and so on. A 16*2 LCD means it can display 16 character per line and there are 2 such lines. In this LCD each character is displayed in 5*7 pixel matrix. This LCD has two registers,namely,command register stores the command instructions given to the LCD.A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen,seting the cursor position, controlling display etc.

3.3Archticture of FPGA

A FPGA is programmable logic device which carry out relatively large logic circuit.The building blocks of FPGA are:

- Configurable logic blocks(CLBs)
- I/O blocks
- Digital clock manager(DCM)

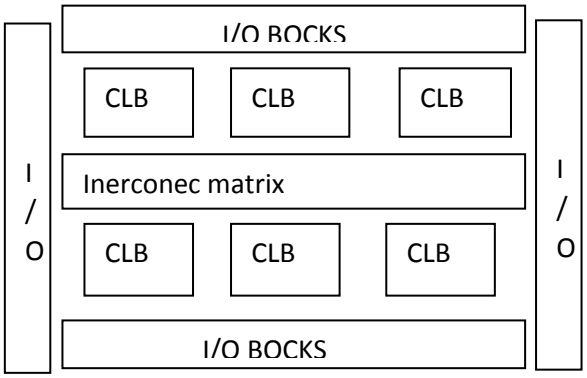

Fig 3.3:Archeurre of FPGA

3.3.1 CLB

The six dot cell representation of Braille character could be numbered from 1to6 starting from top left to bottom right in the order left to right and top to bottom. The numbers 7,4,1,8,5,2 of keypad are mapped to the dots 1,2,3,4,5,6respectively[1].With the number pad the number sequence of the Braille character are typed and used for further conversion.

3.3.2 I/O Blocks

Logic cells(LC) are grouped into configurable logic block. Each and every logic block has smaller number of input and output in FPGA.LUT(lookup table) is the most commonly used logic block, which contain storage cell used to implements logic function. They are available in different sizes varied by number of input. A single logic value i.e 0 or 1 is the holding capability of each cell in FPGA,I/O standards by individually configured banks. An I/O block helps FPGA to work with devices using multiple I/O standards. Interfacing between I/O standard is possible using FPGA.

3.3.3 Multiplier

18 bit binary number input is accepted by multiplier block to calculate product.DCM provides multiplying,dividing,phaseshifting,delay and many more function. Multiplier is associated with each column, which is made up of 18Kbit RAM blocks.

IVACKNOWLEDGMENT

We are profoundly grateful to our staff members and parents for their guidance and continuous encouragement about project.
We would like to express our deepest appreciation for fulfillment of project towards Dr. T. K. Nagaraj, Principal, JSPM's BhivarabaiSawant Institute of Technology and Research, Wagholi (Pune). At last we must express our sincere heartfelt gratitude to all persons who helped us directly and indirectly during this work.

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