Indian Journal of Emerging Electronics in Computer Communications,
Volume.3, Issue.1, 2016, Page.552-555
www.scientistlink.com/ijeecc

Encoding of Closed Caption in a Video Using Matlab

P.Manohari [1], K.Sivakumar [2]
[1]PG Scholar, [2]Associate Professor
Department of Electronics and Communication Engineering
SKR Engineering College, Chennai, India
[1] mmanoharisp@gmail.com, [2]sivagm@gmail.com

Abstract : *CLOSED CAPTION Decoder presents the integration of several IPs to produce a system-on-chip (SoC) for digital television STB compliant to the SBTVD standard. The digital television (DTV) transport stream is planned to accommodate NTSC &DTV caption services DTVCC. The project report describes how services are inserted into and transported within the bit stream and the challenges that must be overcome in order to provide properly format and corresponding captioning. These service transmission starts at the caption encoding head end feeding the DTV encoder and ends at the decoding hardware in the DTV receiver. Obstacle to be overcome include ensure system integration, minimize codec latency and maintain synchronization. Consciousness of these concerns is essential for engineers and management in the digital video industry. Besides, those systems are built from heterogeneous processing units designed to perform specific tasks in order to maximize the on the whole system efficiency.*

Keywords – *ATSC, CEA-708, DTVCC, Line 21, PSIP*

I. INTRODUCTION

The Digital Television system has the technological capacity to supply closed-captions that is the capability to transmit and receive captions or informational text equipment on especially equipped television receivers without in any case intrusive with the performance of conventional receivers and thus not trying those who do not need or wish to make use of the captioning service. While the television picture is construct of 525 lines, the first 21 lines is collectively called vertical interval. In each image field are blank to allow for necessary transmitter and receiver picture synchronize functions to take place. Some of these blank lines can be used to transmit data in many forms including captions. Since these lines normally do not appear on the home television screen, the coded information contain on them can only be seen when converted to visible images by some decoding device [1]. Since PBS has preferred Line 21 for caption data transmission, the last line before the start of the regular transmitted picture and the PBS closed captioning system has come to be known as the Line 21 System. Closed caption codes are included in standard television broadcast signals on line 21 of the standard television broadcast signal. Decoders in adaptors or in special television receivers decode these signals and display the captions on television screens for the hearing impaired. Television images are produced at the rate of 30 per second by 525 horizontal lines. Captions are created from the transcript of a program. A captioned separates the dialogue into captions and make confident the words appear in synchronization with the audio they explain. Programs are captioned at different speeds depending on the cleverness and speed of delivery of the language of the spoken text. Closed captions viewers require a set-top decoder or a television with built-in decoder circuitry Captions allow listeners who are deaf or hard of hearing to follow the conversation and the action of a program concurrently.

II. OVERVIEW

1.1 OBJECTIVE

Captions are language displayed on a television screen. It is capability to receive and transmit captions or informational text material (Wide spread accessibility).They encodes the caption information and it combine with audio and video. Its support several languages.

1.2 CLOSED CAPTION DECODER

Captioning is the text display of the audio content of an on-screen presentation. Captions agree to a deaf or hard of hearing person to go after the conversation and action of the presentation. Captioning includes text explanation of the sounds within the presentation, not just the verbal dialogue. For broadcast and VHS usage, captions are encoded on Line 21 of the video signal, need a decoding device to view, and are displayed as white text on a black environment.

The intention of the DTVCC (708) caption data channel is to present a much higher data rate to the closed caption decoder in a DTV receiving device. This enable the extended quality sets, services and viewer control over the display described in EIA-708-B and distinct and requisite by a related FCC Report and Order (FCC-00-259) adopted on July 21, 2000.An further CEA Engineering Bulletin CEB-10 provides EIA-708-B implementation guidance for caption authors and decoder manufacturers. It is designed to perform specific tasks in order to maximize the on the whole system effectiveness. It supports the multiple languages as we need. Subtitles are similar to captions in that they provide a text display of spoken contented on the other hand subtitles in general do not contain the entire audio portion of the presentation. somewhat, subtitles generally contain just the spoken conversation or present the discussion in another words. As well, although subtitles do not require a decoding device to be viewed, subtitles do not have the skill to set a background color for improved readability. At the same time as there are technical differences between subtitles and captions, it is entirely allowable to deliver captions using the subtitle track of the DVD. In other words, it is allowable to include the spoken text conversation as well as other audio elements on a subtitle track of the DVD [6]. The profit of this approach is that persons who do not have a captioning decoder can enable the suitable subtitle track and view the "captioned" information.

1.3 CAPTION MODES

POP-ON CAPTIONS: A slogan or sentence appears on the screen all at once not row by row stays there for a few seconds and then disappears or is replaced by a new complete caption. The captions are timed to coordinate with the program and placed on the screen to help categorize the speaker. Pop-on captions are used for prerecorded captioning.

ROLL UP CAPTIONS: Roll onto and off the screen in a continuous motion. Generally two or three lines of text appear at one time. while new line comes beside, it appears normally on the bottom pushing the other lines on the screen up. Roll-up captions are used for all live captioning and can also be used for prerecorded captioning.

1.4 LINE 21 CLOSED CAPTION

In the NTSC television format line 21 in the vertical blanking interval has been allocated to carry closed captioning information. Television station an NTSC closed captioning encoder is used to place the data on line 21. At home, moreover a recent model Television or a special STB decoder could be used to decode the closed captions and key the text onto the screen. Each field can contain only two characters at one time 16 bytes. NTSC there are 60 fields per second so the entire system can transmit a total of 2 x 60 = 120 characters per second.

1.5 CEA-708&608

This technique is self-governing of production format and equally applicable to captioning SD and HD program material for native 708 captioning the data from the captioning computer is process and inserted as caption distribution packet embedded in VANC packets in the video signals in accordance with SMPTE334M vertical ancillary data mapping for bit serial interface.VANC packets are transported as an integral part of the digital video signal yet particular arrangements have to be made at any point in the distribution chain where VANC data may be removed. This standards defines the coding of data, including captioning which is carried in line 21 of an analog NTSC video signal[4] .It allows for up to four caption services per program and provide a well-known limited range of white characters within a box-like black background field.

1.6 ATSC & PSIP

ATSC receiver recovers the bits representing the original video, audio, and other data from the modulated signal. In particular, the receiver performs the following functions: Tunes the selected 6-MHz channel. discards adjacent channels and other sources of interference Demodulate the received signal apply error correction to produce a transport bit stream .Identifies the elements of the bit stream using a transport layer processor. Select each desired element and send it to its suitable processor. Decodes and synchronizes each element Performs product-specific video, audio, and data processing. Presents the programming to the appropriate video or audio transducer. The PSIP protocol was developed with these real-world situations in mind. It is a small collection of tables planned to operate within every transport stream for terrestrial broadcast of digital television. Its reason is to express the information at the system and event levels for all virtual channels carried in particular TS. Furthermore, information for analog channels as well as digital channels from other transport

streams may be integrated. There are two main categories of information in the ATSC PSIP Standard and system information and program data's. The System information allows navigation and access of the channels within the DTV transport stream, and the program data provide required information for well-organized browsing and event selection. Some tables make known future events and some be used to locates the digital streams than make up an event. The PSIP data are approved via a collection of hierarchically arranged tables [5]. The primary components and the notation used to describe them.

III. STEP BY STEP ALGORITHM

This algorithm of the future model is given as follows:

Step 1: We use Matlab software for encoding closed caption.First the video is read in Matlab This is an input video should be given in the MATLAB. Use the Video Reader functions with the read methods to read video datas from a file into the MATLAB.

Step 2: The video is partition into frames .Frames are nothing but some image files.The total frames we have 533.The height and width should be obtained.

Step 3: We decided font size and format, colormap for the closed caption should be given.

Step 4: We decided the caption location it's like top or bottom.

Step 5: Finally Each frames have two caption lines are inserted.

IV. FIGURES

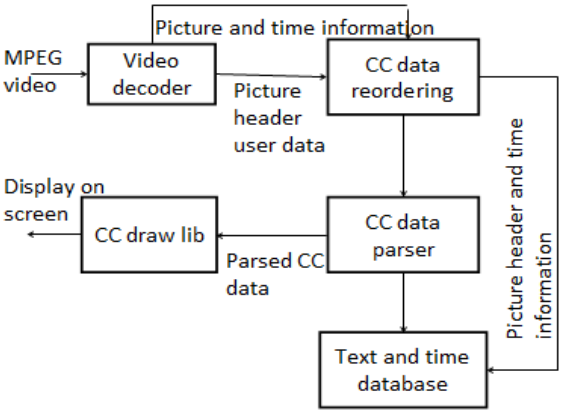

Fig: Proposed system architecture

V. RESULT

The proposed model has been analyzed. The video file size is 4.59Mb. They are totally 533 frames are obtained. 30 frames per second. We done different languages using Matlab. They overall efficiency of character and symbols from every alphabet are obtained. Closed Caption has to decide the location at the bottom or top, they put different font size and font format as we needed. This image files are understood as the matrices in the MATLAB. The time duration for sustaining the closed caption over the frame is fixed. encoding closed caption should be obtained. The size of the video file is 4.59Mb. The total number of frame is 533 and the height and width of the image is 360*640. The number of closed caption data is 1066 lines but we done only 140 lines.

VI. Conclusion

Encoding of closed caption in a video is designed in matlab using MATLABR2014a design is based on display closed caption data in the video file. Software implementation need only encoding part of closed caption..Here rectified the existing problem successfully. In future, it has been planned to implement the same hardware wise. This work can be further extended to make decoder hardware. Future work also focus on the audio file. It will be verified and synthesized using XILINX ISE simulator for hardware implementation.

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