

A SYSTEM AND METHOD FOR PROCESSING SEPARATED VIDEO AND AUDIO SIGNALS

Field of the invention

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The present invention relates to a processing system and a method, more particularly to process separated video and audio signals for reducing the loading and rising the quality of the system.

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Background of the invention

Video and audio processing systems are utilized in the field of education, communication, and entertainment. Especially, the systems are applied to be karaoke machines (is a form of entertainment in which a machine plays tapes of the tunes of pop songs, and people take it in turns to use a microphone to sing the words) . There are several problems in the conventional karaoke system which is played with tapes, such as the low quality of sound and difficulty of tape protection. In the LD (laser disk) karaoke system, there are also problems, such as the less flexibility of usage and aging of read head of the karaoke system.

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A prior art method to resolve these problems is to use compressing techniques (i.e. MPEG1, MPEG2) to compress AV (audio and video) information into digital data, then storing the compressed data in the storage device (i.e. hard disk, VCD, DVD, server, etc.) . A microprocessor can provide powerful function to

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rearrange the order of the songs and select the desired singers, in accordance with the user's favorite. Therefore, the method not only can avoid the defects illustrating previous, but also increasing the flexibility of usage.

5 A disadvantage of the prior art method is that the compressed AV data is still too large to store in the storage device. For example, a four minutes song is compressed by the MPEG2 protocol that needs 40MB storage memories. If the karaoke system is planted to
10 install 5000 songs, and then it would require 200GB storage memories. This situation would waste the storage resource and rise the cost of the manufacture process.

Referring to Fig1A, another improving method is storing the audio data in MIDI type in the main machine
15 106. The video signals are directly conducted from the player108(such as videotape machine or LD player)to the main machine 106. Thereafter, the audio and video signals are mixed, and the mixed signals are sent to the monitor and displayed on the screen. Meanwhile the main machine
20 decodes the audio data storing in the storage device, and the decoded data is displayed from the speaker 104.

Fig2 is a block diagram of the prior art. Users can select their preferred songs through the user interface 201, and their commands are coded into a digital command
25 signal through the command decoder 203. The command signal is sent to the MIDI audio generator 204 in which the audio signals are created. The speaker 206 displays the audio signals which are received from the MIDI audio generator 204. Another part of the command signals are
30 sent to text generator 205 for providing the graphics(i.e. .

the logo) or words which are accompanied with the chosen song from the selection of the user. Meanwhile, through the second user interface, the user can directly control the image generator 207 to provide video signals which are created by the tapes or laser disks inside the image generator 207. Thereafter, the image output device receives these word and image signals and displays the signals to be the background movie of the chosen song.

The MIDI music is essentially consisted of the kinds of music instruments, the beats of the songs, and the power of the melody, which are stored as samples in the storage devices. Although the memory spaces are fewer, but the music quality is not as natural as we hearing from the conventional music player in daily life are. In another point, the image generator still has to face the aging problem of the read head.

Therefore, how to improve the situations we discussed before is getting more and more important.

Summary of the invention

The present invention provides a system and method to process separated images, graphics, and sounds, whereby providing an integrated and flexible using environment.

The invention discloses a system and method to transform the image, graphic, and audio information to digital data. Each of the data is compressed and stored as a database. More particularly, the image data is compressed and stored in several hours' length in the storage device. When the graphic data is decoded according to the user's desires, through an integrated

user interface, the image data is randomly accessed from the digital image database, thereafter, transforming the image data into the decoded image signals. If the image data is run to the end, it will be repeated again. Thus, a
5 great amount of image data can be replaced to a less one. The decoded image signals mixes with the decoded graphic signals, and then the mixed signals are displayed on the image output device. Meanwhile, the audio signals decoded from a decoder are synchronized with the mixed
10 signals and output from the speaker.

In the invention, the audio data is stored as the PCM (Pulse Code Modulation) protocol. So it could provide a very natural music quality. Moreover, another advantage in the invention is that the image information is randomly
15 and repeatedly accessed, thereby decreasing the loading of the storage devices.

Brief Describing of the Drawings

20 Fig1A is a schematic constitution of a karaoke system according to a prior art.

Fig1B is a schematic constitution of a A/V processing system according to the present invention.

25 Fig2 illustrates a flow diagram of the karaoke system of the prior art.

Fig3 illustrates a flow diagram of the A/V processing of the invention.

Fig4 illustrates a flow diagram of the audio processing means of the present invention.

30 Fig5 illustrates a flow diagram of the text processing means of the present invention.

Fig6 illustrates a flow diagram of the image processing means of the present invention.

Fig7 is a flow chart showing the operation steps of the invention.

5 Fig8 is a flow chart showing the operation steps of the audio signals.

Fig9 is a flow chart showing the operation steps of the image signals.

Fig10 is a flow chart showing the overlap steps of the
10 image signals and graphic signals.

Detailed Description of the Preferred Embodiments

A preferred embodiment of the invention is described
15 blow. This embodiment is merely exemplary. Those skilled in the art will appreciate that changes can be made to the disclosed embodiment without departing from the spirit and scope of the invention.

Fig3 shows a AV processing system. Through the user
20 interface 301, the commands are sent into the command decoder 302 in which it is transformed into digital signals. The signals are sent to the audio processing means 303, graphic processing means 304, and image processing means 305, respectively. The compressed digital image
25 signals(i.e. MPEG1,MPEG2) are randomly selected and then decompressed inside the image processing means 305. Thereafter, the decompressed digital image signals are sent to the overlap device 307. According to the signals form the command decoder 302, the text processing means
30 decodes the compressed graphic data (including text .

data) which is desired by the users and sends it to the overlap device 307. Meanwhile, a synchronized signal 306 which records the states of the graphic signals is generated from the text processing means and sent to the
5 audio processing means 303. The overlap device 307 mixes the decoded digital image signals and the decoded digital graphic signals which comes from the text processing means. Then, the D/A converter accepts the digital mixed signals from the overlap device 307 and
10 transforms the digital signals into analogous signals. Then the analogous signals are sent to the image output device 310, and the signals are displayed on the image output device 310. According to the synchronized signal 306 which is sent from the text processing means 304, the
15 audio processing means 303 transforms the corresponding audio data into the analogous audio signals, and the analogous audio signals are displayed on the audio output device 308. Said means and devices could be integrated into a system which includes main machine 103, monitor
20 101, speaker 105, just as Fig1B shows. Additionally, the main machine 103 comprises a microchip and a storage device to process said functions.

Referring to Fig4, the audio processing means 303 comprises a microprocessor 401, a digital audio database
25 402, a audio decoder 403, and a D/A converter 404. The microprocessor 401 responds to the signals from the command decoder 302 and the synchronized signal from the text processing means 306 to select the preferred digital compressed audio data from the digital audio
30 database 402 in which the audio data is stored according to the PCM protocol. The database 402 could be a hard

disk, a VCD, a DVD, or a server. Then the selected digital compressed audio data is sent to the audio decoder 403 to decode into decoded digital audio signals. Then the decoded digital audio signals are sent to the D/A converter 404, and the D/A converter transforms the digital audio signals into the analogous audio signals. Thereafter, the analogous audio signals are sent to the audio output device by the D/A converter.

Referring to Fig5, the text processing means 304 comprises a microprocessor 501, a digital database 502, and a text and graphic decoder 503. The microprocessor 501 responds to the signals from the command decoder 302 to select the preferred digital compressed text data (including graphic data) from the digital text database 502, meanwhile it also generating a synchronized to the audio processing means 303. The database 502 could be a hard disk, a VCD, a DVD, or a server. Then the selected digital compressed text data is sent to the text and graphic decoder 503 to decode into decoded digital graphic and text signals. Thereafter, the decoded graphic and text signals are sent to the overlap device 307 by the text and graphic decoder 503.

Referring to Fig6, the image processing means 305 comprises a microprocessor 601, a digital image database 602, and a image decoder 603. The microprocessor 601 responds to the signals from the command decoder 302 to select the preferred digital compressed image data from the digital image database 602. The database 602 consists of several hour films which could be selected randomly and repeatedly by the microprocessor 601 so that it could use the less image data to provide the background movies.

Then the selected digital compressed image data is sent to the image decoder 603 to decode into decoded digital image signals. Thereafter, the decoded image signals are sent to the overlap device 307 by the image decoder 603.

5 Fig7 illustrates the main flow chart of this invention. The invention starts at block 701 and proceeds to the block 702 where a logo is displayed. The system next proceeds to the block 703 where a main menu is played. At block 704, the system determines whether a valid choice
10 was entered; if not, the system proceeds to block 705, if so, the system proceeds to block 706. At block 705 if a valid background music choice is entered, the system proceeds to block 707 to process background audio and video data; if not, the system returns to block 703. At
15 block 706, the system processes the assigned audio data and randomly accesses the video data. The system proceeds to block 708 where the audio signals are decoded. The system next proceeds to block 709 where the video
20 (image) signals are decoded. Then the system proceeds to block 710 to overlap two kinds of signals (it is described below) . At block 711, the system determines whether a abort signal is entered; if not, it goes to the main routine, if so, it returns to block 704.

 Fig8 depicts a flowchart for a decoding audio data
25 routine. Block 801 shows that the system reads the audio data. At block 802, the system decodes the audio data which is compressed before. The system next proceeds to block 803 in which the decoded audio signals are output to block 804 and block 805. At block 804, the system
30 transforms the digital audio signals into the analogous .

signals, and then it proceeds to block 806 where the analogous audio signals are displayed. At block 805, the system determines whether a valid abort signal is entered; if not, it returns to block 801, if so, it goes to block 807
5 and then exits from the subroutine.

Fig9 depicts a flowchart for a decoding image data routine. Block 901 shows that the system reads the video (image) data. At block 902, the system decodes the audio data which is compressed before. The system next
10 proceeds to block 903 in which the decoded image signals which consists of the Y, U, and V parameters (brightness, hue, saturation) are output to block A and block 904. At block 904, the system determines whether a valid abort signal is entered; if not, it returns to block 901, if so, it
15 goes to block 905 and then exits from the subroutine.

Fig9 depicts a flowchart for an overlap routine. At block 110, the system reads the graphic and text messages. The system next proceeds to block 120 where it mixes the graphic and text messages and the image Y/U/V signals
20 which comes from block A. The system proceeds to block 130 to output the mixed signals to block 140 and block 150. At block 140, the system transforms the digital signals into the analogous signals, and then the analogous signals are displayed at block 160. At block 150, the system
25 determines whether a valid abort signal is entered; if not, it returns to block 110, if so, it goes to block 170 and then exits from the subroutine.

As is understood by a person skilled in the art, the forgoing description of the preferred embodiment of the
30 present invention is illustrative of the present invention

rather than a limitation thereon. It is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims. The scope of the claims should be accorded with the broadest
5 interpretation so as to encompass all such modifications on the similar structure. While the preferred embodiment of the invention has been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the
10 invention.

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What is claimed is:

- 11 -



1. A system for processing separated video and audio signals, comprising:

5 text processing means for providing decoded digital graphic and text signals and a synchronized signal, the digital graphic and text signals being words and information of selected songs;

10 image processing means for generating decoded digital image signals, the digital image signals being images of background of the selected songs;

an overlap device for overlapping the decoded digital graphic and text signals and the decoded digital image signals to generate digital overlapped signals; and

15 audio processing means responsive to said synchronized signal for generating decoded audio signals.

2. The system of claim 1, wherein said text processing means comprises a digital text and graphic database for
20 providing a compressed graphic and text data.

3. The system of claim 2, wherein said text processing means comprises a graphic and text signal decoder for decoding the compressed graphic and text data to generate
25 said decoded digital graphic and text signals.

4. The system of claim 1, wherein said image processing means comprises a digital image database for providing a compressed image data.

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5. The system of claim 4, wherein said image



- 12 -

processing means comprises a microprocessor for randomly reading the compressed image data from the digital image database.

5 6.The system of claim 5, wherein said image processing means comprises a image decoder for decoding the compressed image data to generate said decoded image signals.

10 7.The system of claim 1, further comprising a D/A converter for receiving the digital overlapped signals, and transforming the digital overlapped signals into analogous overlapped signals.

15 8.The system of claim 7, further comprising an image output device for receiving the analogous overlapped signals and transforming the analogous overlapped signals into outputting images.

20 9.The system of claim 1, wherein said audio processing means comprises a digital audio database for providing a compressed audio data.

25 10.The system of claim 9, wherein said compressed audio data is compressed according to a PCM (Pulse Code Modulation) protocol.

30 11.The system of claim 10, wherein said audio processing means comprises a audio signal decoder for decoding the compressed audio data to generate said decoded digital audio signals.



12.The system of claim 11, wherein said audio processing means comprises a D/A converter for receiving the decoded digital audio signals, and transforming the
5 decoded digital audio signals into analogous audio signals.

13.The system of claim 12, further comprising an audio output device for receiving the analogous audio
10 signals and transforming the analogous audio signals into outputting sounds.

14.A system for processing separated video and audio
15 signals, comprising:

text processing means for providing decoded digital graphic and text signals and a synchronized signal, the digital graphic and text signals being words and information of selected songs;

20 image processing means for generating decoded digital image signals, the digital image signals being images of background of the selected songs;

an overlap device for overlapping the decoded digital graphic and text signals and the decoded digital image
25 signals to generate digital overlapped signals; and

a D/A converter for receiving the digital overlapped signals, and transforming the digital overlapped signals into analogous overlapped signals; and

30 audio processing means responsive to said synchronized signal, and generating decoded analogous audio signals from a compressed audio data which is

compressed according to a PCM protocol.



15. The system of claim 14, wherein said image processing means comprises a digital image database for providing a compressed image data.

16. The system of claim 15, wherein said image processing means comprises a microprocessor for randomly reading the compressed image data from the digital image database.

17. The system of claim 14, further comprising an image output device for receiving the analogous overlapped signals and transforming the analogous overlapped signals into outputting images.

18. The system of claim 14, further comprising an audio output device for receiving the analogous audio signals and transforming the analogous audio signals into outputting sounds.

19. A method for processing separated video and audio signals, comprising:

reading compressed digital audio signals, the digital audio signals being music of selected songs;

reading compressed digital image signals, the digital image signals being images of background of the selected songs;

processing the compressed digital audio signals for transforming the compressed digital audio signals into analogous audio signals;



- 15 -

processing the compressed digital image signals for
decoding the compressed digital image signals into digital
image signals;

inputting digital graphic and text signals, the digital
5 graphic and text signals being words and information of
the selected songs;

mixing the digital image signals and the digital
graphic and text signals for generating overlapped signals;
and

10 outputting the analogous signals and the overlapped
signals.

20. The method of claim 19, further comprising a
transforming step behind said mixing step to transform
15 the overlapped signals from digital signals into analogous
signals.

21. The method of claim 19, wherein said processing
the compressed digital image signals step comprises a
20 decoding step.

22. The system of claim 19, wherein said analogous
signals and the graphic and text signals are displayed at
the same time.

25 23. The system of claim 19, wherein said reading
compressed digital image signals step is randomly
selecting from a database.

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