Method of Initiating Interactivity in an Enhanced Digital Television Broadcast Using the Broadcaster's Station ID

BACKGROUND

1. FIELD

The present invention relates generally to interactive digital television systems and, more specifically, to commencing interactivity with the digital television broadcast.

2. DESCRIPTION

Viewers are accustomed to watching television (TV) in a "full screen" mode. That is, the current TV broadcast signal fills up the entire viewing surface, edge to edge, of the TV set or other display monitor. With the advent of digital TV, viewers expect additional interactive capabilities, but viewers also expect the familiar experience of full screen TV viewing. When the digital TV program is enhanced with additional interactive digital content, digital TV provides the viewer with new ways of interacting with a TV program. Yet with the new capabilities come new problems. How does the viewer initiate interaction with ancillary digital content (e.g., interactive content) that may arrive at times as part of the digital TV signal when the primary digital content (i.e., the TV program) covers the entire TV screen?

One approach has been to limit the size of the TV viewing area to less than the full screen and to place ancillary digital content on one or more edges of the TV program display. The content around the TV program typically becomes interactive and can be updated at specific times during a program broadcast. Of course, this solution takes away the full screen aspect of watching TV. Another approach is to place one or more display objects over the top of the full screen TV viewing area. For example, the display object might be a user interface button to go to an interactive mode of operation. The viewer then selects the display object

to initiate interaction with the ancillary content. This approach almost provides the full screen TV viewing experience. However, a significant drawback of this approach is that the display object obstructs the view of the TV program in the area where it is placed. Clearly, neither of these approaches is ideal. A better method of initiating interaction with ancillary digital content in an enhanced digital TV broadcast that ensures a full screen viewing experience is desired.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the present invention will become apparent from the following detailed description of the present invention in which:

Figure 1 is a diagram of a prior art TV program being shown in full screen mode;

Figure 2 is a diagram of a TV program being shown in full screen mode along with an animated broadcaster station ID according to an embodiment of the present invention;

Figure 3 is a diagram of a TV program being shown in interactive screen mode with interactive data being displayed in the remainder of the screen according to an embodiment of the present invention;

Figure 4 is a diagram of a system for initiating interaction with an enhanced digital TV broadcast according to an embodiment of the present invention;

Figure 5 is a flow diagram illustrating initiating interaction with an enhanced digital TV broadcast according to an embodiment of the present invention; and

Figure 6 is a diagram of a system capable of being used as a receiver system according to an embodiment of the present invention.

DETAILED DESCRIPTION

An embodiment of the present invention is a method of allowing a viewer to watch an enhanced broadcast digital TV program in full screen mode and to initiate interactivity with ancillary digital content contained in the broadcast digital enhanced stream without significantly obstructing viewing of the program.

Reference in the specification to "one embodiment" or "an embodiment" of the present invention means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrase "in one embodiment" appearing in various places throughout the specification are not necessarily all referring to the same embodiment.

Figure 1 is a diagram of a prior art TV program being shown in full screen mode. In the typical analog mode, a TV program is shown completely filling up the screen 10. When the TV broadcast is digital, the TV program can also be shown in full screen mode as represented in Figure 1. Figure 2 is a diagram of a TV program 12 being shown in full screen mode along with an animated broadcaster station ID 14 according to an embodiment of the present invention. Most TV broadcasters currently insert a station identifier (ID) symbol or "bug" into the TV signal prior to broadcast. For example, this might be the logo or other identifier of the broadcaster (e.g., "CNN", "CNBC", a stylized "H" for the History Channel, etc.). The station ID informs the viewer which broadcaster is broadcasting programming content that is currently being received by the viewer's TV receiver. Viewers are used to seeing this ID overlaying the TV program on the screen. In some cases, the ID may be partially transparent, so the viewer can still see the entire underlying program. When the ID is partially transparent, the ID is less obtrusive.

As part of an enhanced digital TV broadcast signal according to an embodiment of the present invention, the position of the station ID on the screen and additional "sprites" or additional information to animate the station ID may be sent to a receiving system. For purpose of this application, a sprite is a relatively small visual object or image. These additional sprites may be blended into the TV program video signal without causing further obstruction to the viewing of the program in full screen mode. These sprites, animating at times when new

ancillary digital content has arrived via the TV signal at the receiver system, may be used in conjunction with the station ID to indicate to the viewer that interactive digital content has arrived at the receiver. For example, the station ID may flash intermittently when new ancillary digital content has arrived. The lines surrounding the ID 14 in Figure 2 are an illustrative representation to indicate a change in appearance of the ID to signify the arrival of ancillary digital content, and are not intended to be a limitation on the scope of the present invention. Ancillary digital content as used herein refers to any data accompanying the audio and video signals of the TV program. Although animation is discussed with reference to one embodiment, it should be understood that any change in position, coloration, size, or other visible attribute of the station ID may be used to indicate that ancillary digital content is available according to the present invention.

In one embodiment, the user may initiate interaction with ancillary digital content at a subsequent point in the program by selecting the station ID even when the station ID is not currently being animated.

Once the viewer selects, using any known user interface mechanism, the animated station ID, interaction with the ancillary digital content may be started. Figure 3 is a diagram of a TV program 16 being shown in interactive screen mode with ancillary digital content denoted interactive data 18 being displayed in the remainder of the screen according to an embodiment of the present invention. The interaction may include more sprites blended into the TV video, hyper text markup language (HTML) pages around the TV video, or any interaction based on World Wide Web (WWW) technology. In each case, the data presented is interactive; that is the viewer can interact with the data using any known user interface.

For example, suppose the viewer is watching an enhanced digital TV broadcast of a sporting event such as a football game. Normally, the view of the current action on the field may be shown on the entire screen. A broadcaster ID may be represented in one portion, such as a corner, of the screen, reminding viewers that they are watching programming content supplied by a particular broadcaster. The station ID symbol is typically small in relation to the overall size

of the full screen. When the broadcaster broadcasts ancillary digital content such as game statistics, for example, the broadcaster includes information in the data portion of the enhanced broadcast digital TV signal to animate the station ID to indicate to the viewer that the latest statistics are available. The viewer notices and then selects the station ID using a user interface, the viewing mode switches to an interactive mode, and the viewer may see the statistics or other data in the interactive data portion of the screen. The viewer may then continue to interact with the ancillary digital content.

Of course, this is but one example of interaction with ancillary digital content. The content may be any data presented to the viewer for any purpose. This method of initiating interaction may be used for any interactive content carried on a broadcast digital TV signal. Embodiments of the present invention include animating or otherwise highlighting and selecting the broadcast station ID or other display object to initiate interaction with ancillary digital content while still in full screen mode for the TV program. The use of the present invention may add value to the broadcaster's brand by focusing the viewer's attention on the broadcaster's station ID to initiate interactivity.

Figure 4 is a diagram of a system for initiating interaction with an enhanced digital TV broadcast according to an embodiment of the present invention. The system shown in Figure 4 includes a receiver system for receiving an enhanced digital TV signal 42 from a broadcast source (not shown). The enhanced TV signal may be received via any well-known method, such as by over-the-air broadcast, by cable, by satellite transmission, or by a computer network (e.g., the Internet or an intranet). The enhanced digital TV signal 42 comprises audio, video, and data components. The data component may include ancillary digital content for a TV program represented by the audio and video components. The data component may be annotated or tagged in well-known ways to be in sync with the audio and video components. The video component may include a broadcaster logo or station ID blended into the TV picture by the broadcaster using any of several well-known methods (e.g., alpha blending). The receiver system may comprise an analog TV set with digital TV converter logic, a digital TV, a set-top box, a personal computer (PC) system, a personal digital assistant

(PDA), a handheld computer, or any other device capable of receiving and processing digital TV signals. The receiver system displays the TV program on display 44. Display 44 may be a television, a computer monitor, or other display device. Within the receiver system, an audio/video decoder 46 processes the audio and video components of the broadcast digital TV signal. The processed audio and video data may be supplied by display driver 48 for rendering on the display. The display driver combines the audio and video elements into a stream for representation on the display and associated audio circuitry (not shown).

According to embodiments of the present invention, data decoder 50 processes the data component of the enhanced digital TV signal stream. The data may include ancillary digital content associated with the audio and video components. As part of embodiments of the present invention, data decoder comprises ID extractor logic 52, ID animator logic 54, and ID interaction logic 56. ID extractor logic 52 parses the data component of the enhanced TV signal stream to obtain the position on the screen of the broadcaster's station ID, information relating to when to animate or otherwise change the appearance of the station ID on the screen, information describing processing to perform when the ID is selected by the viewer, and any other information necessary for supporting interactivity with the ancillary digital content. ID animator logic 54 animates or otherwise temporarily changes the appearance of the broadcaster's station ID display object to get the attention of the viewer. The animation or other appearance change may be applied when ancillary digital content available for interaction is present in the enhanced broadcast digital TV signal stream. ID interaction logic 56 accepts viewer input (such as the selection of the station ID) to interact with the ancillary digital content. For example, the interaction may include requests to display text, images, or video associated with the audio/video portion of the TV program in a portion of the TV screen. The text, images, or video associated with the audio/video portion of the TV program may be obtained from the received enhanced TV signal, a storage medium within the receiver system, or from an external source coupled to the receiver system, such as another device or the Internet. The ID animator logic and ID interaction logic forward display data to display driver 48 for eventual representation on display 44. In some

embodiments, the data decoder may store portions of or all of the data component on a storage medium within or coupled to the receiver system.

Figure 5 is a flow diagram illustrating initiating interaction with an enhanced digital TV broadcast according to an embodiment of the present invention. At block 100, the receiver system receives the enhanced digital TV signal, the enhanced digital TV signal including audio, video, and data components. At block 102, the enhanced digital TV signal may be decoded into its constituent parts. At block 104, the audio and video components of the signal may be processed and rendered by the receiver system and the display. That is, the audio portion may be converted into sound and the video portion may be converted into images by the display. Additionally, the data component may be saved within the receiver system for further processing. Next, at block 106, the station ID information may be extracted from the data component (e.g., position, time to display, animation characteristics, and the like), if present. At block 108, the station ID may be animated on the display or otherwise have its appearance change to attract the attention of the viewer based on received timing information in the data component.

At block 110, if viewer input is received in response to the station ID animation or appearance change, processing continues with block 112, whereby an interactive mode of operation may be entered for the receiver system. If no viewer input is received, then processing continues with displaying audio and video data at block 104. If the interactive mode of operation is entered, portions of the data component may be decoded and shown on the display for viewing by the viewer and other viewer interaction may be processed at block 114. At block 116, if viewer input is received indicating a desire to return to full screen TV, non-interactive mode, then interactive mode is terminated and the receiver system display the audio and video components of the enhanced TV signal on the entire screen of the display. Processing then continues with block 104. Otherwise, further interactivity is desired and processing continues with block 114.

Thus, a method of initiating interactivity with an enhanced digital TV program has been described. This method provides full screen capability for the display of the audio and video components of the TV signal, while allowing the

viewer to be notified of incoming ancillary digital content without disrupting the full screen viewing of the TV program.

In the preceding description, various aspects of the present invention have been described. For purposes of explanation, specific numbers, systems and configurations were set forth in order to provide a thorough understanding of the present invention. However, it is apparent to one skilled in the art having the benefit of this disclosure that the present invention may be practiced without the specific details. In other instances, well-known features were omitted or simplified in order not to obscure the present invention.

Embodiments of the present invention may be implemented in hardware or software, or a combination of both. However, embodiments of the invention may be implemented as computer programs executing on programmable systems comprising at least one processor, a data storage system (including volatile and non-volatile memory and/or storage elements), at least one input device, and at least one output device. Program code may be applied to input data to perform the functions described herein and generate output information. The output information may be applied to one or more output devices, in known fashion. For purposes of this application, a processing system embodying the receiver system includes any system that has a processor, such as, for example, a digital signal processor (DSP), a microcontroller, an application specific integrated circuit (ASIC), or a microprocessor.

The programs may be implemented in a high level procedural or object oriented programming language to communicate with a processing system. The programs may also be implemented in assembly or machine language, if desired. In fact, the invention is not limited in scope to any particular programming language. In any case, the language may be a compiled or interpreted language.

The programs may be stored on a removable storage media or device (e.g., floppy disk drive, read only memory (ROM), CD-ROM device, flash memory device, digital versatile disk (DVD), or other storage device) readable by a general or special purpose programmable processing system, for configuring and operating the processing system when the storage media or device is read by the processing system to perform the procedures described herein. Embodiments of

the invention may also be considered to be implemented as a machine-readable storage medium, configured for use with a processing system, where the storage medium so configured causes the processing system to operate in a specific and predefined manner to perform the functions described herein.

An example of one such type of processing system is shown in Figure 6, however, other systems may also be used and not all components of the system shown are required for the present invention. Sample system 400 may be used, for example, to execute the processing for embodiments of the receiver system, in accordance with the present invention, such as the embodiment described herein. Sample system 400 is representative of processing systems based on the PENTIUM®II, PENTIUM® III, and CELERON™ microprocessors available from Intel Corporation, although other systems (including personal computers (PCs) having other microprocessors, engineering workstations, other set-top boxes, and the like) and architectures may also be used.

Figure 6 is a block diagram of a system 400 of one embodiment of the present invention. The system 400 includes a processor 402 that processes data signals. Processor 402 may be coupled to a processor bus 404 that transmits data signals between processor 402 and other components in the system 400.

System 400 includes a memory 406. Memory 406 may store instructions and/or data represented by data signals that may be executed by processor 402. The instructions and/or data may comprise code for performing any and/or all of the techniques of the present invention. Memory 406 may also contain additional software and/or data (not shown). A cache memory 408 may reside inside processor 402 that stores data signals stored in memory 406.

A bridge/memory controller 410 may be coupled to the processor bus 404 and memory 406. The bridge/memory controller 410 directs data signals between processor 402, memory 406, and other components in the system 400 and bridges the data signals between processor bus 404, memory 406, and a first input/output (I/O) bus 412. In this embodiment, graphics controller 413 interfaces to a display device (not shown) for displaying images rendered or otherwise processed by the graphics controller 413 to a user.

First I/O bus 412 may comprise a single bus or a combination of multiple buses. First I/O bus 412 provides communication links between components in system 400. A network controller 414 may be coupled to the first I/O bus 412. In some embodiments, a display device controller 416 may be coupled to the first I/O bus 412. The display device controller 416 allows coupling of a display device to system 400 and acts as an interface between a display device (not shown) and the system. The display device receives data signals from processor 402 through display device controller 416 and displays information contained in the data signals to a user of system 400.

A second I/O bus 420 may comprise a single bus or a combination of multiple buses. The second I/O bus 420 provides communication links between components in system 400. A data storage device 422 may be coupled to the second I/O bus 420. A keyboard interface 424 may be coupled to the second I/O bus 420. A user input interface 425 may be coupled to the second I/O bus 420. The user input interface may be coupled to a user input device, such as a remote control, mouse, joystick, or trackball, for example, to provide input data to the computer system. An audio controller 427 may be coupled to the second I/O bus for handling processing of audio signals through one or more loudspeakers (not shown). A bus bridge 428 couples first I/O bridge 412 to second I/O bridge 420.

Embodiments of the present invention are related to the use of the system 400 as a receiver system. According to one embodiment, such processing may be performed by the system 400 in response to processor 402 executing sequences of instructions in memory 404. Such instructions may be read into memory 404 from another computer-readable medium, such as data storage device 422, or from another source via the network controller 414, for example. Execution of the sequences of instructions causes processor 402 to execute digital TV processing according to embodiments of the present invention. In an alternative embodiment, hardware circuitry may be used in place of or in combination with software instructions to implement embodiments of the present invention. Thus, the present invention is not limited to any specific combination of hardware circuitry and software.

The elements of system 400 perform their conventional functions in a manner well-known in the art. In particular, data storage device 422 may be used to provide long-term storage for the executable instructions and data structures for embodiments of the receiver system in accordance with the present invention, whereas memory 406 is used to store on a shorter term basis the executable instructions of embodiments of the receiver system in accordance with the present invention during execution by processor 402.

While this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well as other embodiments of the invention, which are apparent to persons skilled in the art to which the inventions pertains are deemed to lie within the spirit and scope of the invention.

What is claimed is:

1. A method of initiating interactivity with a received enhanced digital TV program comprising:

displaying a video component of the enhanced digital TV program in a full screen mode on a display;

extracting information related to a broadcaster's station ID from a data component of the enhanced digital TV program;

displaying the station ID in a changed appearance on the display according to the information; and

accepting a viewer input selection to enter an interactive mode in response to the changed appearance.

2. The method of claim 1, wherein displaying the station ID in a changed appearance comprises animating the station ID.

3. The method of claim 1, wherein displaying the station ID in a changed appearance comprises making a change in at least one of position, coloration, and size of display of the station ID.

4. The method of claim 1, wherein displaying the station ID in a changed appearance comprises blending the changed appearance with the full screen display of the video component to make the changed appearance at least partially transparent.

5. The method of claim 1, further comprising interacting by a viewer with ancillary digital content included in the data component in response to accepting the viewer input selection.

6. The method of claim 1, wherein the information comprises at least one of the position on the display of the station ID, information relating to when to animate or otherwise change the appearance of the station ID on the display, and information describing further processing to perform when the station ID is selected by the viewer to enter the interactive mode.

7. The method of claim 1, wherein displaying the station ID in a changed appearance comprises displaying the station ID in a changed appearance when new ancillary digital content is received as part of reception of the enhanced digital TV program.

8. An article comprising: a storage medium having a plurality of machine readable instructions, wherein when the instructions are executed by a processor, the instructions provide for initiating interactivity with a received enhanced digital TV program by displaying a video component of the enhanced digital TV program in a full screen mode on a display, extracting information related to a broadcaster's station ID from a data component of the enhanced digital TV program, displaying the station ID in a changed appearance on the display according to the information, and accepting a viewer input selection to enter an interactive mode in response to the changed appearance.

9. The article of claim 8, wherein instructions for displaying the station ID in a changed appearance comprises instructions for animating the station ID.

10. The article of claim 8, wherein instructions for displaying the station ID in a changed appearance comprises instructions for making a change in at least one of position, coloration, and size of display of the station ID.

11. The article of claim 8, wherein instructions for displaying the station ID in a changed appearance comprises instructions for blending the changed appearance with the full screen display of the video component to make the changed appearance at least partially transparent.

12. The article of claim 8, further comprising instructions for interacting by a viewer with ancillary digital content included in the data component in response to accepting the viewer input selection.

13. The article of claim 8, wherein the information comprises at least one of the position on the display of the station ID, information relating to when to animate or otherwise change the appearance of the station ID on the display, and information describing further processing to perform when the station ID is selected by the viewer to enter the interactive mode.

14. The article of claim 8, wherein instructions for displaying the station ID in a changed appearance comprises instructions for displaying the station ID in a changed appearance when new ancillary digital content is received as part of reception of the enhanced digital TV program.

15. A system for initiating interactivity with a received enhanced digital TV program being displayed on a display in a full screen mode comprising:

extractor logic to extract information related to a broadcaster's station ID from a data component of the enhanced digital TV program;

animator logic to cause the display of the station ID in a changed appearance on the display according to the information; and

interaction logic to accept a viewer input selection to enter an interactive mode in response to the changed appearance.

16. The system of claim 15, wherein the animator logic to cause the display the station ID in a changed appearance comprises logic to animate the station ID.

17. The system of claim 15, wherein the animator logic to display the station ID in a changed appearance comprises logic to make a change in at least one of position, coloration, and size of display of the station ID.

18. The system of claim 15, wherein the animator logic to display the station ID in a changed appearance comprises logic to blend the changed appearance with the full screen display of the video component to make the changed appearance at least partially transparent.

19. The system of claim 15, wherein the interaction logic further comprises logic for interaction by a viewer with ancillary digital content included in the data component in response to accepting the viewer input selection.

20. The system of claim 15, wherein the information comprises at least one of the position on the display of the station ID, information relating to when to animate or otherwise change the appearance of the station ID on the display, and information describing further processing to perform when the station ID is selected by the viewer to enter the interactive mode.

21. The system of claim 15, wherein the animator logic causes the display of the station ID in a changed appearance when new ancillary digital content is received as part of reception of the enhanced digital TV program.

22. A method comprising:

receiving audio, video, and data components of an enhanced digital TV program;

decoding and rendering the audio and video components for perception by a viewer, the video component being shown in a full screen mode of a display;

extracting information relating to a broadcaster's station ID from the data component;

displaying the station ID in an animated form based on the information;

accepting a viewer input selection to commence an interactive mode in response to the animated station ID; and

interacting with ancillary digital content included in the data component in response to the viewer input selection.

23. The method of claim 23, wherein the information comprises at least one of the position on the display of the station ID, information relating to when to animate the station ID on the display, and information describing further processing to perform when the station ID is selected by the viewer to enter the interactive mode.

24. The method of claim 23, further comprising interacting with the ancillary digital content in a first portion of the display while the video component is rendered in a second portion of the display.