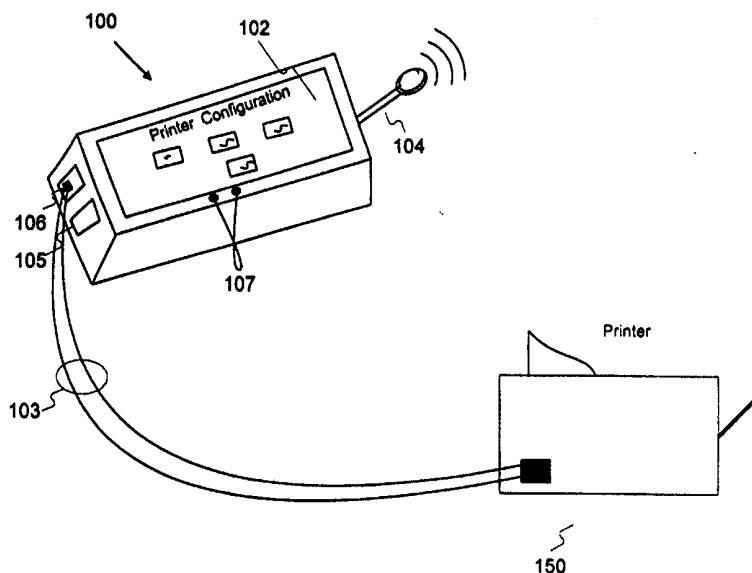




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(54) Title: PORTABLE USER INTERFACE VIEWING DEVICE



(57) Abstract

A small portable viewing device (100, 400) provides a user interface for a plurality of consumer electronic devices. The consumer device transmits the functionality and visual layout of its user interface to the viewing device. The viewing device displays the user interface of the consumer electronic device on its display (102, 404) and transmits information entered through the interface back to the consumer device. The viewing device (100, 400) allows the user to access the features and functions of each of the plurality of devices without requiring each device to have a separate physical user interface.

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Portable User Interface Viewing Device

Technical Field

The present invention relates generally to consumer electronic devices, and more specifically, to human interfaces for consumer electronic devices.

Background Art

Consumer electronic (CE) devices, such as televisions, stereos, and DVD players, play an important role in the modern home. Conventional CE devices are controlled by the user through an interface built into the device. CE device interfaces typically include some type of display, such as an LCD display, and buttons or a remote control for interacting with the device.

Cost constraints dictate that many CE devices are implemented with the bare minimum user interface necessary to operate the device. This minimalistic implementation of the interface coupled with user unfamiliarity with the new interface can make it difficult to use.

Thus, there is a need in the art to provide improved user interfaces for CE devices.

Disclosure of the Invention

A portable viewing device consistent with the present invention comprises a processor, a display, a network interface, and a memory. The memory contains digital data received from a consumer electronic device, the digital data defining a user interface of a consumer electronic device on the display, and based on information received from a user through the user interface, the portable viewing device transmits commands to the consumer electronic device.

A network consistent with another aspect of the present invention comprises a portable viewing device, a consumer electronic device, and transmission means. The portable viewing device includes processor, a display, and a memory. The consumer electronic device includes a memory storing digital data defining a user interface used to access functionality of the consumer electronic device. Finally, the transmission means transmits the digital data stored in the consumer electronic device to the memory of the portable viewing device when a user requests access to the portable viewing device.

A method consistent with yet another aspect of the present invention comprises the steps of requesting a user interface from the remote device; receiving digital data corresponding to the requested user interface from the remote device; displaying the user interface for the remote device; receiving commands for the remote device through the user interface; and transmitting commands to the remote device.

Still another aspect of the present invention is directed to an electronic device comprising a display portion and a base portion. The display portion includes a processor; a display; a wireless data transceiver circuit; and a memory coupled to the processor and the display, the memory containing digital data received from a consumer electronic device, the instructions causing a user interface of a consumer electronic device to be presented on the display, and based on information received from a user through the user interface, transmitting commands to the consumer electronic device. The base portion includes a wireless data transceiver circuit for communicating with the transceiver circuit of the display portion; a slot for holding the display portion; and a network interface coupled to a network of consumer electronic devices.

A consumer electronic device consistent with the present invention comprises a processor; a memory coupled to the processor, the memory containing digital data defining a user interface for the consumer electronic device; and a circuit for transmitting the digital data to a second device when requested by the second device.

Brief Description of Drawings

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate several embodiments consistent with this invention and, together with the description, help explain the principles of the invention. In the drawings,

Fig. 1 is a diagram illustrating a portable viewing device hosting a user interface for a consumer electronic device consistent with an aspect of the present invention;

Fig. 2 is a functional block diagram illustrating interaction of the hardware and software components of the viewing device;

Fig. 3 is a flow chart illustrating methods consistent with the present invention for controlling a device; and

Fig 4 is an alternate embodiment of a portable viewing device consistent with a second aspect of the present invention.

Best Mode for Carrying Out the Invention

Reference will now be made in detail to embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

A small portable viewing device is described herein that is capable of providing a user interface for a plurality of CE devices. The viewing device allows the user to access the features and functions of each of the plurality of devices without requiring each device to have a separate physical user interface.

Fig. 1 is a diagram illustrating a viewing device 100 hosting a user interface for a CE device, shown as exemplary client printer 150. Viewing device 100 and printer 150 are connected through a cable 103 using a network interface, preferably a serial interface standard, and most preferably a high-speed serial interface such as the IEEE-1394 digital interface standard. Although not shown, other CE devices can be connected to printer 150 or viewer 100 to thereby create a network of CE devices. The IEEE-1394 digital interface is a serial digital interface enabling high-speed (up to 400 Mbps) data communication among multimedia equipment such as video camcorders, electronic still cameras, computers, and digital audio/visual equipment. Features of the IEEE-1394 include live connection/disconnection without data loss or interruption; automatic configuration supporting "plug and play"; and flexible network topology allowing mixing branches and daisy-chains. More complete information regarding IEEE-1394 is available from the Institute of Electrical and Electronics Engineers (IEEE). In applications where speed is not critical, a lower speed serial interface may be used, such as the Universal Serial Bus (USB).

Viewing device 100 includes a port 106 for inserting an IEEE-1394 compatible cable and an optional port 105 through which power for recharging the batteries of viewing device 100 is supplied.

Although viewing device 100 is shown communicating with client printer 150 using an IEEE-1394 digital interface, other communication mechanisms are possible, such as a wireless radio frequency (RF) link and supporting circuitry to convert received RF information to an IEEE-1394 compatible format. Optional antenna 104 is used when implementing an RF link. The RF link allows viewing device 100 to connect to radio frequency (RF) enabled devices in the CE device network. Other communication mechanisms, such as infrared, are additionally possible.

Graphical display 102, which may be implemented as an LCD, presents the user interface of printer 150. For example, through graphical display 102, the user may view the status of the printer or the progress of a particular print job. The user interface presented by display 102 is preferably graphical, although a text only interface could also be used. Further, display 102 may present its interface in either landscape or portrait mode. The selection of which display mode to use may be made either by the user, or by the viewing device itself when it has the ability to detect its orientation. One way of allowing the viewing device to detect its orientation is by providing pads on the viewing device that indicate orientation when inserted into another device.

The user may interact with viewing device 100 using any of a number of standard input mechanisms. For example, display 102 may be pressure-sensitive, allowing the user to enter information either by touching the screen with a finger or by touching the screen with a stylus. Other input mechanisms are possible, including, but not limited to voice input, buttons 107, or receiving input from other devices in an IEEE-1394 device network.

Fig. 2 is a functional block diagram illustrating interaction of the hardware and software components of viewing device 100. A CPU 202, a memory 203, and a display controller 204 are coupled together via a bus 223. These three components make up the core functional components of viewing device 100. Viewing device 100 also includes a network interface 230 and input components 231. As previously mentioned, device 100 may communicate with CE devices in a number of ways, including through RF interface 104 or through a wired connection 106, preferably constituting an IEEE 1394 connection. Circuitry 209 and 210 implement input

functions such as enabling physical buttons 107 or the conversion of audio input into commands. Audio commands are interpreted using speech recognition software. Appropriate speech recognition software is commercially available from a number of well known sources, such as Dragon Systems Inc., of Newton, MA. Audio output port 211 allows viewing device 100 to generate sound either as distinctive tones or speech synthesis.

Power section 205 provides power to the components of viewing device 100. Power section 205 is preferably based on rechargeable batteries but may also be based on non-rechargeable batteries or standard household AC current.

Memory 203 contains digital data including computer instructions that are to be executed by CPU 202. The digital data may be prestored in memory 203 or received from a CE device via network interface 230. By inserting additional memory modules into memory 203, the user may increase the size of memory 203. The additional memory modules may be, for example, a Sony Memory Stick™.

Consistent with an aspect of the present invention, viewing device 100 implements a HAVi (Home Audio/Video Interoperability) architecture. The HAVi architecture specifies a set of Application Programming Interfaces (APIs) allowing consumer electronics manufacturers and third parties to develop applications for a home network in which CE devices from multiple vendors can cooperate to perform tasks. A network of HAVi compliant devices together form a distributed computing platform. The HAVi architecture provides for timely transfer of high-data-rate AV (audio/visual) streams, self-configuration and self-management, and hot plug-and-play. The HAVi architecture additionally provides for the execution of *HAVi bytecode*, which are digital data in the form of computer instructions that are independent of the computer hardware platform system they were compiled on. HAVi bytecodes may thus be executed on any computer platform. Furthermore, information regarding the HAVi architecture specification is set forth in Appendix A, an intermediate draft of an industry standard, published for review and comment.

The user interface presented by display 102 may be generated in one of a number of ways. One way to generate the user interface is to use the “Level 1 Data Driven Interaction (DDI)” support provided for in the HAVi specification. In this

case, the client CE device, such as printer 150, must either contain the necessary HAVi protocols for Level 1 DDI support, or contain a reference to a location where the Level 1 DDI information can be obtained by viewing device 100. Consistent with the HAVi implementation of Level 1 DDI, printer 150 transmits digital data in the form of "DDI elements" to viewing device 100. The DDI elements are predefined user interface objects (e.g., icons or buttons) that have a particular set of attributes (e.g., size, position, color, image content, audio content). Viewing device 100 interprets and displays the interface objects to create the appropriate user interface.

A second way viewing device 100 may generate the user interface is by uploading device independent HAVi bytecodes from the CE device via network interface 230. The bytecodes define a program containing the content and functionality of the user interface.

Fig. 3 is a flow chart illustrating methods consistent with the present invention for controlling a CE device with viewing device 100.

To begin, if the CE device and the viewing device are not physically connected to a common network, the user inserts one or both of the CE device and viewing device in the network (step 301). The user informs the viewing device which CE device the user would like to control. In response, the viewing device requests the appropriate user interface from the CE device (step 302). Computer instructions for generating the interface are preferably stored in the CE device as digital data in the form of HAVi bytecodes, which are uploaded to and executed by the viewing device (steps 303 and 304). Alternatively, as described above, the CE device may simply transmit a series of DDI elements to the viewing device. Commands entered by the user via the uploaded user interface are transmitted through network interface 230 to the CE device (step 305).

Alternatives to the HAVi architecture may also be used to remotely define the user interface. For example, viewing device 100 and client CE device 150 may instead use the HTML (hyper-text markup language) or MHEG (an ISO encoding standard for multimedia applications) standards. The user interface may also be defined using the AV/C Panel Subunit Model, currently under definition by the 1394 Trade Association.

The above described viewing device is a self-contained, portable, universal display device through which a client device projects its user interface. An alternate embodiment of a portable viewing device consistent with the present invention comprises a base portion separate from the display portion of the viewing device. This embodiment is illustrated in Fig. 4.

As shown in Fig. 4, viewing device 400 includes a display portion 401 and a base portion 402. Display portion 401 is similar to viewing device 100 and includes an antenna 403, an LCD or similar display 404, a microphone 405, speakers 406, and battery recharging contacts 407. Communication between display portion 401 and base portion 402 is accomplished through antennas 403 and 412 using a wireless (RF) or infrared (IR) link.

Base portion 402 includes slot 411 for mounting display portion 401. When mounted, battery contacts 407 of display portion 401 contact battery contacts 410 of base portion 402. In this manner, rechargeable batteries in display portion 401 may be recharged. Alternatively, battery charging may be implemented by using a standard IEEE 1394 six-pin connector in place of contacts 407, in which two pins are used to carry power. The IEEE 1394 six-pin connector would thus be used on both display portion 401 and base portion 402, permitting transmission of data between display portion 401 and base portion 402 instead of or in addition to using antennas 403 and 412.

For certain applications involving severe environmental conditions, battery charging is implemented using a non-contact inductive system, in which display portion 401 is inserted into a space defined within a coil mounted base portion 402. Current flowing in the coil of base portion 402 induces current in corresponding coil in display portion 410. The induced current in the display portion coil constitutes charging current for rechargeable batteries in display portion 401.

Base portion 402 additionally includes interface 413, which is an IEEE-1394 wired interface. Through this interface, the base portion 402 is coupled to a home network of CE devices. The network includes television 415, camera 416, printer 417, and radio 418. Devices 415-418 communicate digital data with one another via the IEEE-1394 interface.

The operation of viewing device 400 is similar to that of viewing device 100. The primary difference being that all data transmitted to and from display portion 401 is routed through base portion 402.

It will be apparent to those skilled in the art that various modifications and variations can be made to the present invention without departing from the scope or spirit of the invention. For example, although an IEEE-1394 digital bus standard was described in forming a device network, other standards, such as USB, may be used.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.

Claims

1. A portable control device (100) comprising:
a processor (202);
a display (102);
a network interface (106); and
a memory (203) coupled to the processor (202) and the display (102), the memory (203) containing digital data received from a consumer electronic device via the network interface (106), the digital data defining a user interface of a consumer electronic device on the display (102), and based on information received from a user through the user interface, transmitting commands to the consumer electronic device via the network interface (106).
2. The device of claim 1, wherein the display (102) further comprises a pressure sensitive liquid crystal display (LCD).
3. The device of claim 1, wherein the network interface (106) comprises circuitry for implementing a serial interface standard.
4. The device of claim 1, wherein the network interface (106) comprises circuitry for implementing a high-speed serial bus standard.
5. The device of claim 1, wherein the network interface (106) comprises circuitry for implementing the IEEE-1394 communication standard.
6. The device of claim 3, wherein the network interface (106) further includes an antenna for implementing a wireless interface.
7. The device of claim 3, wherein the network interface (106) further includes a wired connection.
8. The device of claim 3, wherein the digital data is platform independent.
9. A network comprising:
a portable viewing device (100), the viewing device including
a processor (202);
a display (102) coupled to the processor (202); and
a memory (203) coupled to the processor (202);

a consumer electronic device including a memory storing digital data defining a user interface used to access functionality of the consumer electronic device; and means for transmitting the digital data stored in the consumer electronic device to the memory (203) of the portable viewing device when a user requests access to the consumer electronic device via the portable viewing device.

10. The network of claim 9, wherein the digital data are platform independent.

11. The network of claim 9, wherein the network further comprises a plurality of consumer electronic devices coupled together as a network of consumer electronic devices.

12. A method of controlling a remote device comprising the steps of:
receiving a user request, at a control device, for a user interface from the remote device;

receiving digital data at the control device corresponding to the requested user interface from the remote device;

displaying the user interface for the remote device at the control device;

receiving commands at the control device for the remote device through the user interface; and

transmitting commands from the control device to the remote device.

13. An electronic device (400) comprising:

a display portion (401) including

a processor;

a display (404);

a wireless data transceiver circuit; and

a memory coupled to the processor and the display (404), the memory containing digital data received from a consumer electronic device, the digital data defining a user interface of a consumer electronic on the display (404), and based on information received from a user through the user interface, transmitting commands to the consumer electronic device;

a base portion (402) including

a wireless data transceiver circuit for communicating with the transceiver circuit of the display portion;

a slot (411) for holding the display portion (401); and

a network interface (413) coupled to a network of consumer electronic devices.

14. The device of claim 13, wherein the base portion (402) and the display portion (401) further include electrical contacts (407, 410) that touch one another when the display portion is inserted in the base portion, the electrical contacts being used to recharge a rechargeable battery in the display portion.

15. A consumer electronic device comprising:

a processor (202);

a memory (203) coupled to the processor (202), the memory containing digital data defining a user interface for the consumer electronic device; and

a circuit for transmitting the digital data to a second device when requested by the second device.

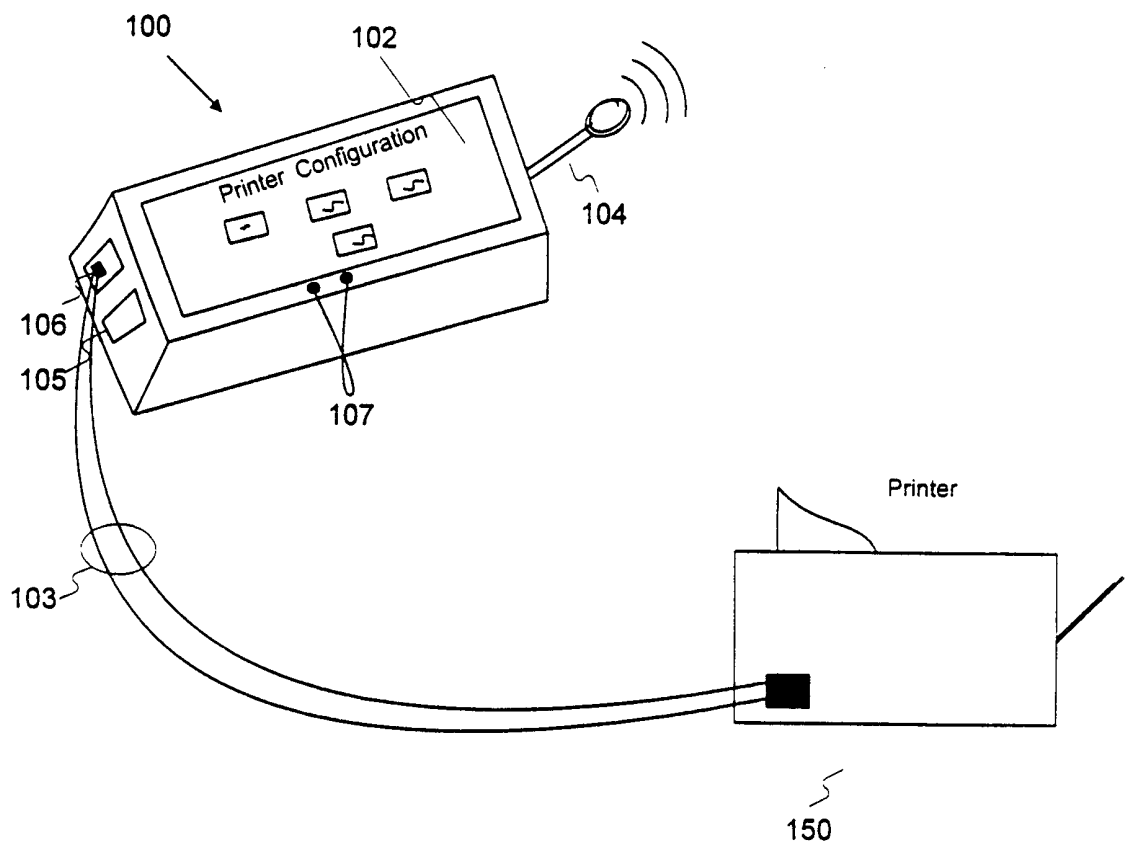


Fig. 1

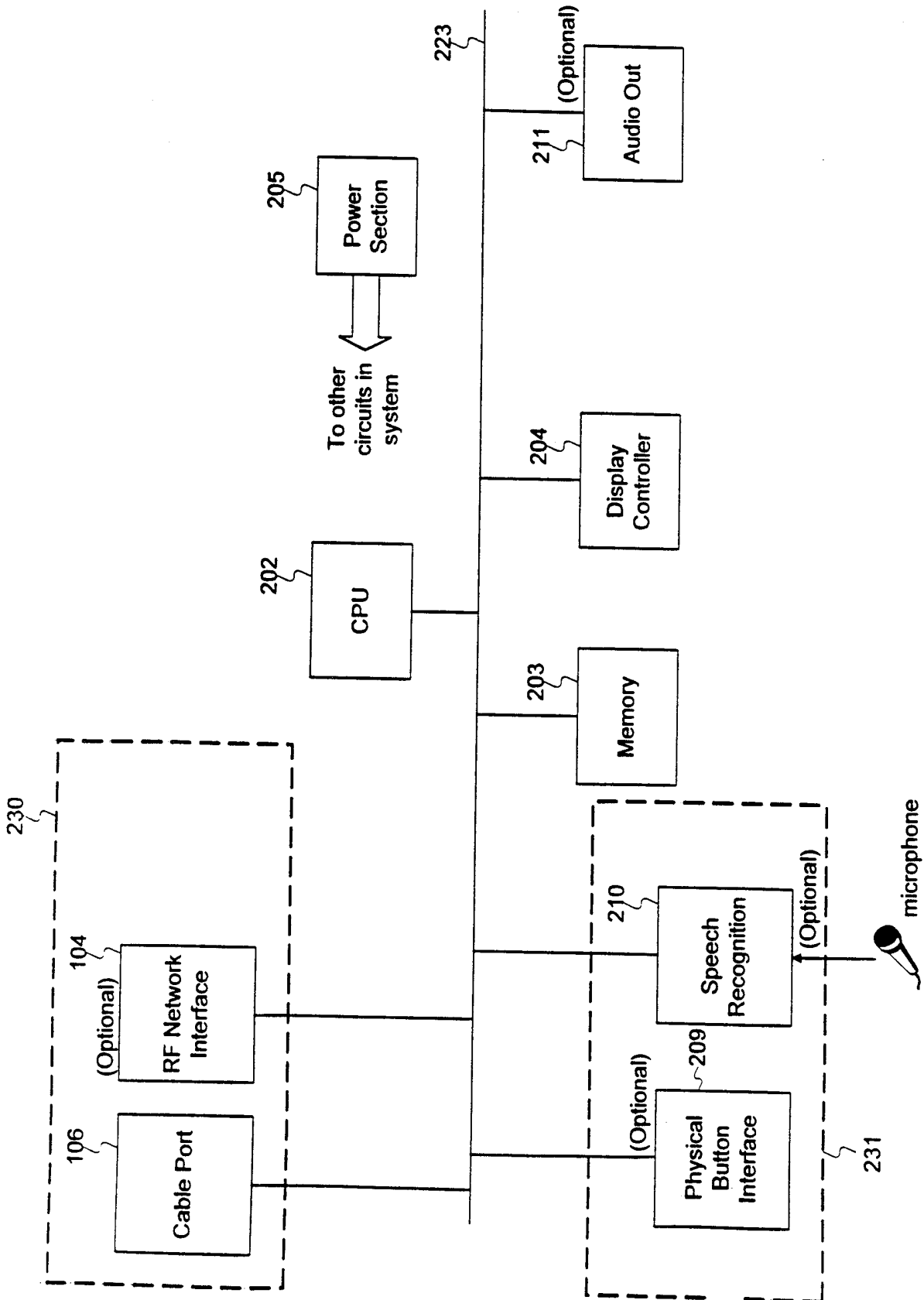


Fig. 2

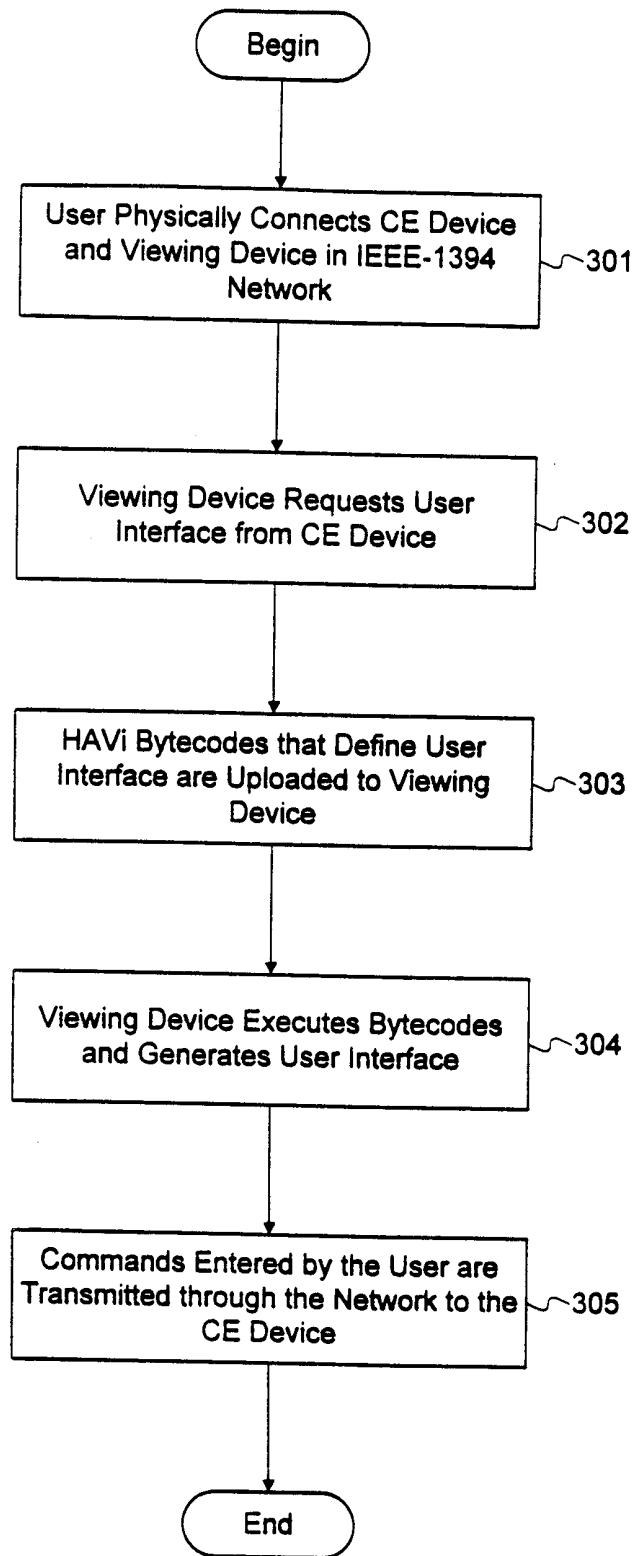


Fig. 3

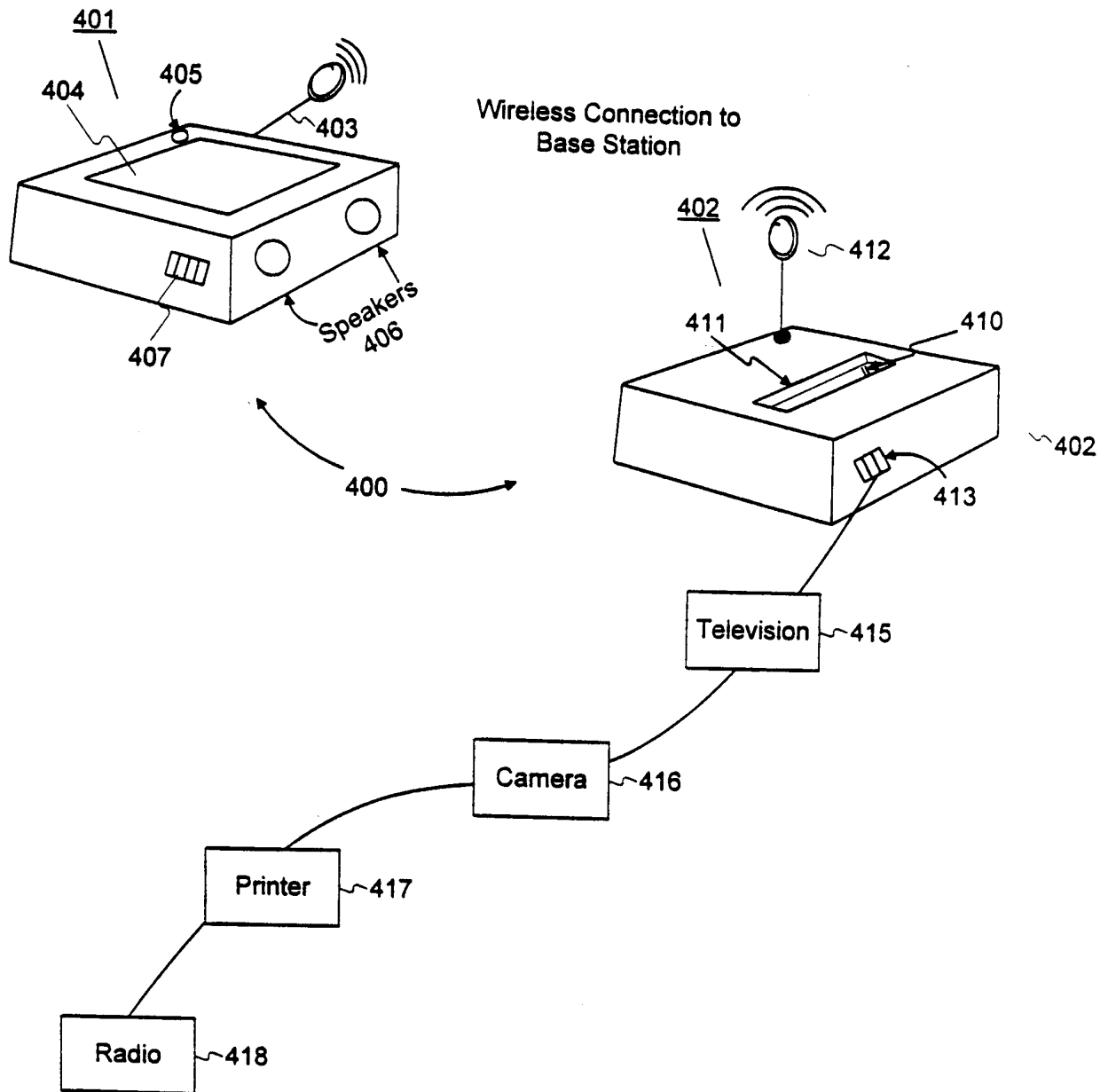


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
CT/US00/01977

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 13/14
US CL : 345/520

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/520, 167, 168; 361/686; 710/8

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,497,464 A (YEH) 05 March 1996, Fig. 2, col. 1, lines 58-63, col. 3, lines 27-40, col.6, lines 1-67, col. 8, lines 5-33.	1-15
X	US 5,666,495 A (YEH) 09 September 1997, col. 6, lines 23-47, col. 8, lines 1-3, 30-46, col. 9, lines 11-28.	1-15

Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of the actual completion of the international search

04 MAY 2000

Date of mailing of the international search report

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