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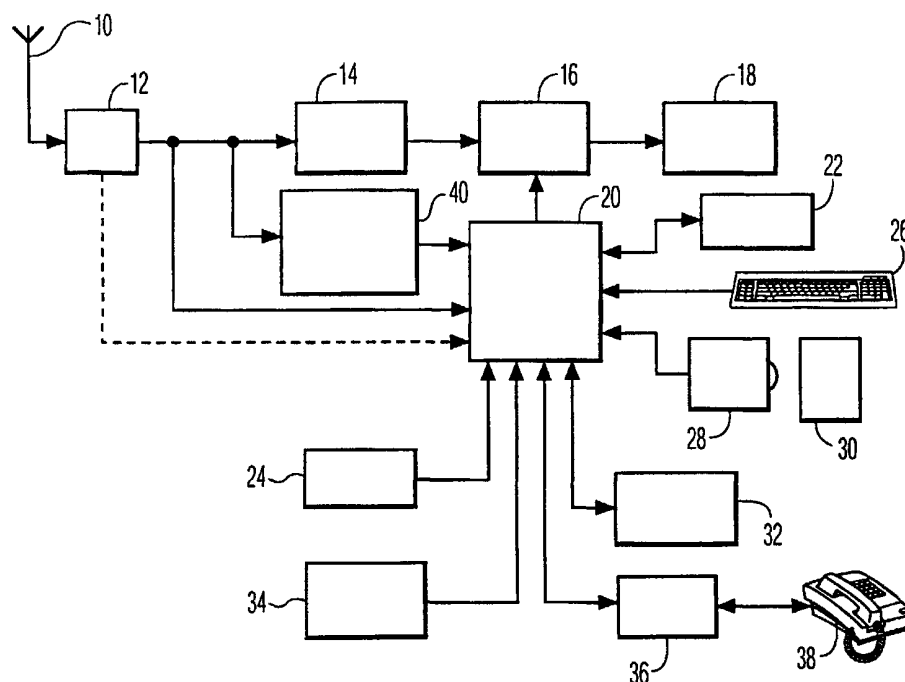
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(54) **Title: METHOD AND APPARATUS FOR SWAPPING THE VIDEO CONTENTS OF UNDESIRED COMMERCIAL BREAKS OR OTHER VIDEO SEQUENCES**

(57) **Abstract:** An apparatus for swapping the content of a video signal detects the content of a video sequence in the video signal using extracted text and/or audiovisual features to identify the content of the video sequence. The identify of the video sequence is then compared with a personal profile of the user. If the content of the sequence is undesired, the apparatus swaps this video sequence with a desired video sequence from a known source (12, 24, 32, 34).

METHOD AND APPARATUS FOR SWAPPING THE VIDEO CONTENTS OF UNDESIRED
COMMERCIAL BREAKS OR OTHER VIDEO SEQUENCES

Field Of The Invention

The subject invention relates to television and, more particularly, to the
manipulation of video segments or video sequences in a television signal.

5

Description Of The Related Art

Television programs, and in particular, broadcast television programs include
advertising commercials to at least partially defer the costs of providing the television
programs to the viewing public. The content of these commercials are predetermined and
10   usually depend on the amount of money an advertiser is willing to pay to have its commercial
broadcast at a specific time. However, no concern is made for the desires of the individual
viewer. The viewer is left to either view commercials he/she has no interest in, leave the
room (e.g., go to the refrigerator to get a snack), or channel surf, i.e., see what programs are
being broadcast on other channels (this can be frustrating in that, invariably, a commercial is
15   usually being broadcast on the other channels). This sometimes causes problems in that the
viewer misses the start of the program he/she was viewing before the start of the commercial.

Consumer video cassette recorders are known which include circuitry for
detecting commercials in a recorded television program and for fast-forwarding the tape to
the end of the commercial. However, the television program must have been previously
20   recorded on a video cassette.

In another situation, television receivers now must include a "V-CHIP" which
detects data sent with a television program concerning the content of the television program,
e.g., the program rating, the violence content, the sexual content, etc. This allows, for
example, a parent to control, at least partially, the content of television programs received for
25   viewing by their children. In the event that the received program is beyond a pre-selected
level, either a message is displayed on the screen indicating that the program (or portion of
the program) exceeds the allowed level, or the viewer is subjected to a "blue screen" (no
video signal for the duration of the program or portion of the program).

It is an object of the invention to provide a method and apparatus for substituting desired video sequences for undesired commercials or programs (or portions of programs).

5   This object is achieved, in a first aspect of the invention, in a method for swapping undesired video in a specific video stream with desired video, said method comprising the steps of detecting a start of a specific video sequence; detecting characteristics of said specific video sequence; comparing said detected characteristics with stored characteristics of other video sequences, said stored characteristics including

10   indicators specifying whether the respective other video sequences are desired; determining whether said specific video sequence is desired based on said stored characteristics; and substituting a desired video sequence in place of said specific video sequence if said specific video sequence is not desired.

A second aspect of the invention provides an apparatus for swapping

15   undesired video in a specific video stream with desired video, said apparatus comprising means for detecting a start of a specific video sequence; means for detecting characteristics of said specific video sequence; means for comparing said detected characteristics with stored characteristics of other video sequences, said stored characteristics including indicators specifying whether the respective other video sequences are desired; means for determining

20   whether said specific video sequence is desired based on said stored characteristics; and means for substituting a desired video sequence in place of said specific video sequence if said specific video sequence is not desired.

Applicants have found that in order to practice the invention, one must first detect the video sequence subject to being replaced. In the case of commercials, there are

25   several known methods including detecting a change in the average light intensity of a video signal, detecting a change in the "activity" level, detecting increased cut rate and the presence of varying size text, detecting the black level in the video signal which would indicate a break in the program where a commercial is inserted, etc. A particular method is disclosed in U.S. Patent Application Serial No. 09/123,444, filed July 28, 1998 (Attorney Docket No.

30   PHA 23,477), assigned to Philips Electronics.

Next, the video sequence needs to be analyzed to detect known characteristic features. U.S. Patent 5,870,754 (Attorney Docket No. PHA 23,104), assigned to Philips Electronics, discloses a method in which video signatures may be extracted from MPEG or Motion JPEG encoded video sequences for identification purposes, and then stored in a

storage medium. Subsequently, a video signature of a suspect video sequence may then be compared with these stored video signature for the purpose of identifying the content of the suspect video sequence.

U.S. Patent Application Serial No. 08/867,140, filed June 2, 1997, assigned to Philips Electronics (Attorney Docket No. PHA 23,252) describes a system which detects significant scenes of a video source, selects keyframes to represent each detected significant scene, and creates a video index for the video source. The current video sequence can then be analyzed and the results of the analysis compared with the stored video index.

As an alternative, the video sequence may be examined to detect text regions in the image. U.S. Patent Application Serial No. 09/370,931, filed August 9, 1999 (Attorney Docket PHA 23,616), assigned to U.S. Philips Corporation, discloses a method and application for detecting text locations in a video signal. Automatic character recognition may then be used to detect 800-numbers, Domain Names, logos and product names The results may then be compared with a list of 800-numbers, Domain Names, logos and product names. Once the, for example, 800-number is identified, the general classification and purpose of the commercial is known.

Once the identity of the commercial is determined, this information is then compared to a personal profile of the user of the apparatus. For example, in the case of a single childless male, commercials for diapers, other baby products or toys, would not be desired. However, that person might be interested in sporting equipment. Therefore, that person's profile would indicate "NO" for baby commercials and "YES" for sporting equipment.

If, now, the commercial is to be substituted, the alternate video stream may be obtained from a number of different sources. For example, the alternate video stream may be stored in a mass storage medium, e.g., a hard disk drive, a video tape, a video disc, etc. Alternatively, the alternate video stream may be the person's e-mail from a global computer network or Web pages (static or in a browse mode). In addition, in the case of digital television in which a plurality of programs may be available on a single channel, alternate commercials may be broadcast in parallel, and a desired commercial may be retrieved from this source.

With the above and additional objects and advantages in mind as will hereinafter appear, the invention will be described with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of an apparatus for swapping video sequences in accordance with the invention;

Fig. 2 is a flowchart showing the functioning of the apparatus of Fig. 1;

Fig. 3 is a flowchart showing a portion of the flowchart of Fig. 2 in greater detail; and

Fig. 4 is a flowchart showing another portion of the flowchart of Fig. 2 in greater detail.

In Fig. 1, input video signals are received on antenna 10 and supplied to a tuner 12. While antenna 10 is shown which would imply that the source of the input video signals is broadcast television, it should be understood that the input video signals may originate from other sources, e.g., cable, satellite, a global computer network, etc. The tuner 12 tunes to a desired video signal and applies the same to a frame memory 14. An output from the frame memory 14 is connected to a video switch 16 which applies its output to display device 18, for example, a television receiver.

A controller 20, which includes an internal microprocessor, controls the operation of the components in the apparatus. A memory 22 in the form of random-access memory (RAM) is connected to the controller 20, as well as a read-only memory (ROM) 24. A keyboard 26 is shown for providing a user interface for the apparatus. Alternatively, an infra-red receiver 28 and corresponding remote transmitter 30 may be connected to the controller 20.

A video storage device 32, for example, a video tape recorder/player, a DVD re-writeable device (DVD-RW), a digital VHS tape recorder/player (D-VHS), a digital video recorder/player (DVR), etc., is shown connected to the controller 20 for recording and supplying video signals. In addition, a video disc player 34 is connected to the controller 20 for providing selected video programming. Finally, a modem 36 is connected to the controller 20 for interfacing with a telephone network 38 for allowing access to a global computer network enabling the sending and reception of e-mail.

The controller 20 is connected to the output of the tuner 12 for receiving the desired video signal. A V-Chip/Meta data extractor 40 is also connected to the output of the

tuner 12 for extracting V-Chip data as well as Meta data which may be transmitted with the desired video signal. Finally, the controller 20 may be additionally connected directly to the tuner 12 for receiving programming on alternate channels.

In operation, referring to the flowchart of Fig. 2, at block 50, the controller 20 receives the video signal at the output of the tuner 12. At block 52, the controller 20 determines whether the video signal contains a commercial. If not, the controller 20 examines, in block 54, the extracted V-Chip data from the V-Chip/Meta data extractor 40 and determines whether the programming in the video signal is restricted (block 56). If not, the controller 20 continues to examine the video signal for commercials (block 52). If the programming is restricted, the controller 20 inserts alternate programming (block 70).

When a commercial is detected, the controller 20 extracts the audiovisual/textual features and/or signature of the commercial in block 58, and compares these features or signature to a stored data-base of such features and signatures (block 60). In block 62, it is determined whether the features and/or signature of the commercial is indeed stored. If not, in block 64, the user is given the option to store the features and/or signature, and if so, the features and/or signatures are stored, in block 66. If the user decides not to store the features and/or signature, the controller 20 exits the flowchart at block 72.

At block 68, the controller 20 determines whether the commercial is desired. If so, the controller 20 exits the flowchart at 72. If the commercial is not desired, at block 70, the controller 20 inserts alternate programming using the video switch 16. The alternate programming may come from any of a plurality of sources. For example, alternate commercials may be stored in the ROM 24, on the video storage device 32, or on video disc using the video disc player 34. In the event of digital television (DTV), each channel may contain several video programming streams among which may be alternate commercials. If so, the alternate commercials may then be accessed for insertion. Otherwise, the controller 20 may access the modem 36 to enable the user to read or send e-mail messages or access Web pages during the commercial break.

The user's personal profile may be stored in the ROM 24 and includes information about the preferred sources, time and duration of substitution. The sources may be, as noted above, the video storage device 32, the video disc player 34, alternate programming from the tuner 12, or the modem 36 for accessing a global computer network for e-mail or web browsing. The user-preferred sources of information may be based on the time of day, for example, in the morning, the user may prefer substitution of another channel, or a personalized news channel in that the user may be getting ready to go to work and would

like a passive content swap. In the evening, the user may prefer a more interactive swapping, for example, e-mail or web browsing.

The duration of the substitution may be based on the type of content, the duration of the content being replaced, and the time of day. For example, if the commercial break is 6 minutes, the user may want 2 minutes of e-mail, and a summary of the commercials. If the commercial is less than 2 minutes, the user may prefer no swapping. Alternatively, other shortened video sequences may be obtained from stored content.

There may also be the occasion where, during a swap, the user has started an e-mail and does not want to be interrupted to go back to the regular programming until the user has finished the e-mail message. In that event, the regular programming may be buffered on, for example, the video storage device 32 or on a Tivo unit (not shown), until the user has finished the e-mail message.

Fig. 3 is a flowchart showing more details of block 58 in Fig. 2. In particular, at block 80, the controller 20 extracts textual data from the output of the tuner 12. At block 82, the controller 20 then compare that extracted data with stored text and determines whether the extracted text is stored (block 84). If so, at block 86, the controller 20 proceeds to block 68 in the flowchart of Fig. 2. If not, the controller 20 then extracts the audiovisual data in block 88 and, at block 90, proceeds with block 60 in the flowchart of Fig. 2.

Alternatively, as noted above, the program in the video signal may include Meta data which characterizes the content of the program and/or commercials. If so, as shown in Fig. 4, the controller 20, after detecting a commercial at block 52 in Fig. 2, then examines, in block 92, the Meta data and uses this data to characterize the commercial. Again, at block 90, this is compared to the user's personal profile in block 68 of Fig. 2, to determine if the commercial is desired, and if not, the controller 20 inserts alternate programming (block 70).

As mentioned in the accompanying claims, video signatures may be derived from audio clues in the video sequence. Where video signatures are so derived from audio clues in the video sequence, these audio clues may include energy, band energy ratio, pause rate, pitch, Fourier transform co-efficients and Mel Spectrum frequency co-efficients. The video signatures may be obtained from closed captioning content.

The stored characteristics referred to in the claims maycomprise a time duration of the video sequence to be substituted.

Where the desired video sequence comprises Web pages, the pages may be scanned passively. Where the desired video sequence comprises Web pages, the pages may be scanned interactively.

Numerous alterations and modifications of the structure herein disclosed will present themselves to those skilled in the art. However, it is to be understood that the above described embodiment is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

CLAIMS:

1.   A method for swapping undesired video in a specific video stream with desired video, said method comprising the steps:

detecting (52) a start of a specific video sequence;   detecting characteristics (58) of said specific video sequence;

5   comparing (60) said detected characteristics with stored characteristics of other video sequences, said stored characteristics including indicators specifying whether the respective other video sequences are desired;

determining (62) whether said specific video sequence is desired based on said stored characteristics; and

10   substituting (70) a desired video sequence in place of said specific video sequence if said specific video sequence is not desired.

2.   The method as claimed in claim 1, wherein said method further comprises the steps:

15   storing (66) said characteristics of said specific video sequence if said characteristics are not already stored; and

storing (66) an indicator specifying whether said specific video sequence is desired.

20   3.   An apparatus for swapping undesired video in a specific video stream with desired video, said apparatus comprising:

means (20) for detecting a start of a specific video sequence;

means (20) for detecting characteristics of said specific video sequence;

means (20) for comparing said detected characteristics with stored

25   characteristics of other video sequences, said stored characteristics including indicators specifying whether the respective other video sequences are desired;

means (20) for determining whether said specific video sequence is desired based on said stored characteristics; and

means (16) for substituting a desired video sequence in place of said specific video sequence if said specific video sequence is not desired.

4.   The apparatus as claimed in claim 3, wherein said apparatus further comprises:

5   means (24) for storing said characteristics of said specific video sequence if said characteristics are not already stored; and

means (24) for storing an indicator specifying whether said specific video sequence is desired.

10   5.   The method of claim 1 or 2 and/or the apparatus of claim 3 or 4 wherein said specific video sequence is a commercial (52) in a television broadcast signal.

6.   The method or apparatus as claimed in any one or more of claims 1 to 5, wherein said characteristics are video signatures of video sequences.

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7.   The method or apparatus as claimed in claim 6, wherein said video signatures are derived from audio clues in the video sequence.

8.   The method or apparatus as claimed in any one or more of claims 1 to 5,

20   wherein said characteristics are textual matter contained in video sequences.

9.   The method or apparatus as claimed in any one or more of claims 1 to 8, wherein said substituting step comprises retrieving said desired video sequence from a storage medium.

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10.   The method or apparatus as claimed in any one or more claims 1 to 8, wherein said specific video stream is on one channel of a digital television broadcast having a plurality of channels, and said substituting step comprises retrieving said desired video sequence from an alternate channel transmitted with said one channel.

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11.   The method or apparatus as claimed in any one or more of claims 1 to 5, wherein said detecting a start of a video sequence comprises detecting Meta data accompanying the video sequence.

12.   The method or apparatus as claimed in claim 11, wherein said Meta data comprises V-Chip data (54), and wherein said step of detecting characteristics comprises comparing (56) the V-Chip data with stored desired personal characteristics of the user.

5   13.   The method or apparatus as claimed in any one or more of claims 1 to 5, wherein said stored characteristics comprise categories of commercials and products.

14.   The method or apparatus as claimed in any one or more of claims 1 to 5, wherein the desired video sequence comprises Web pages (36, 38).
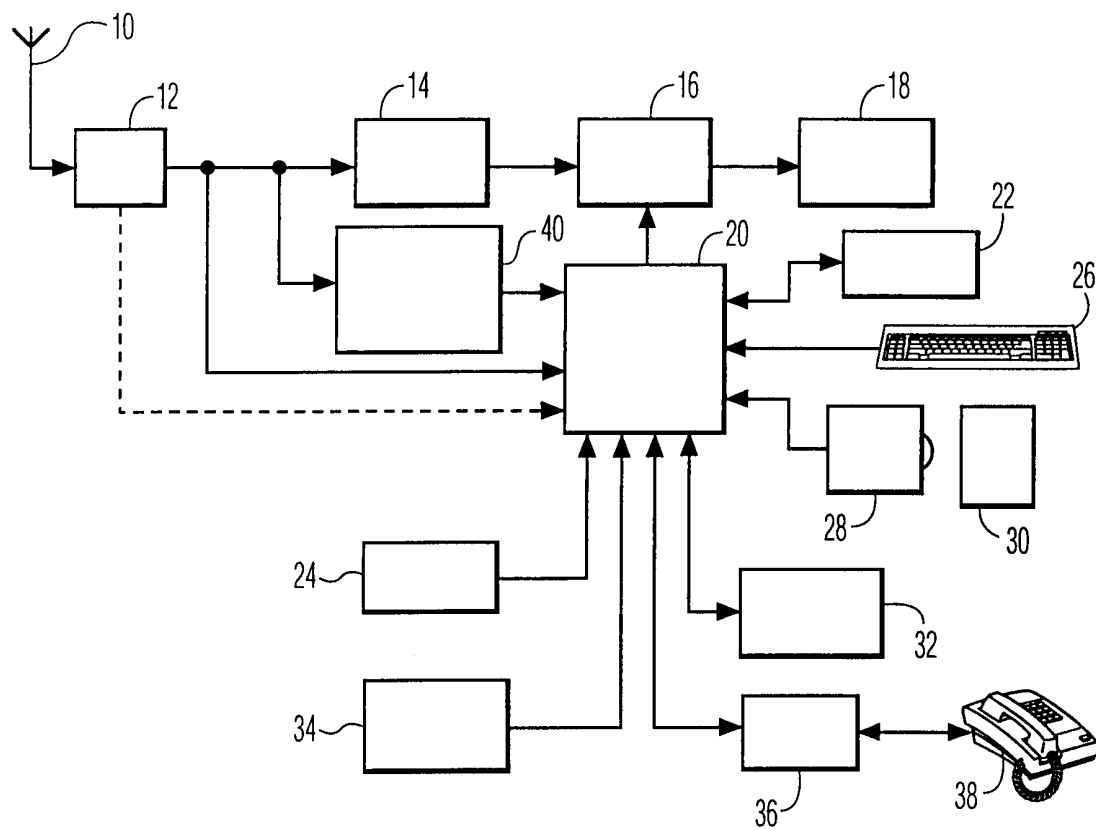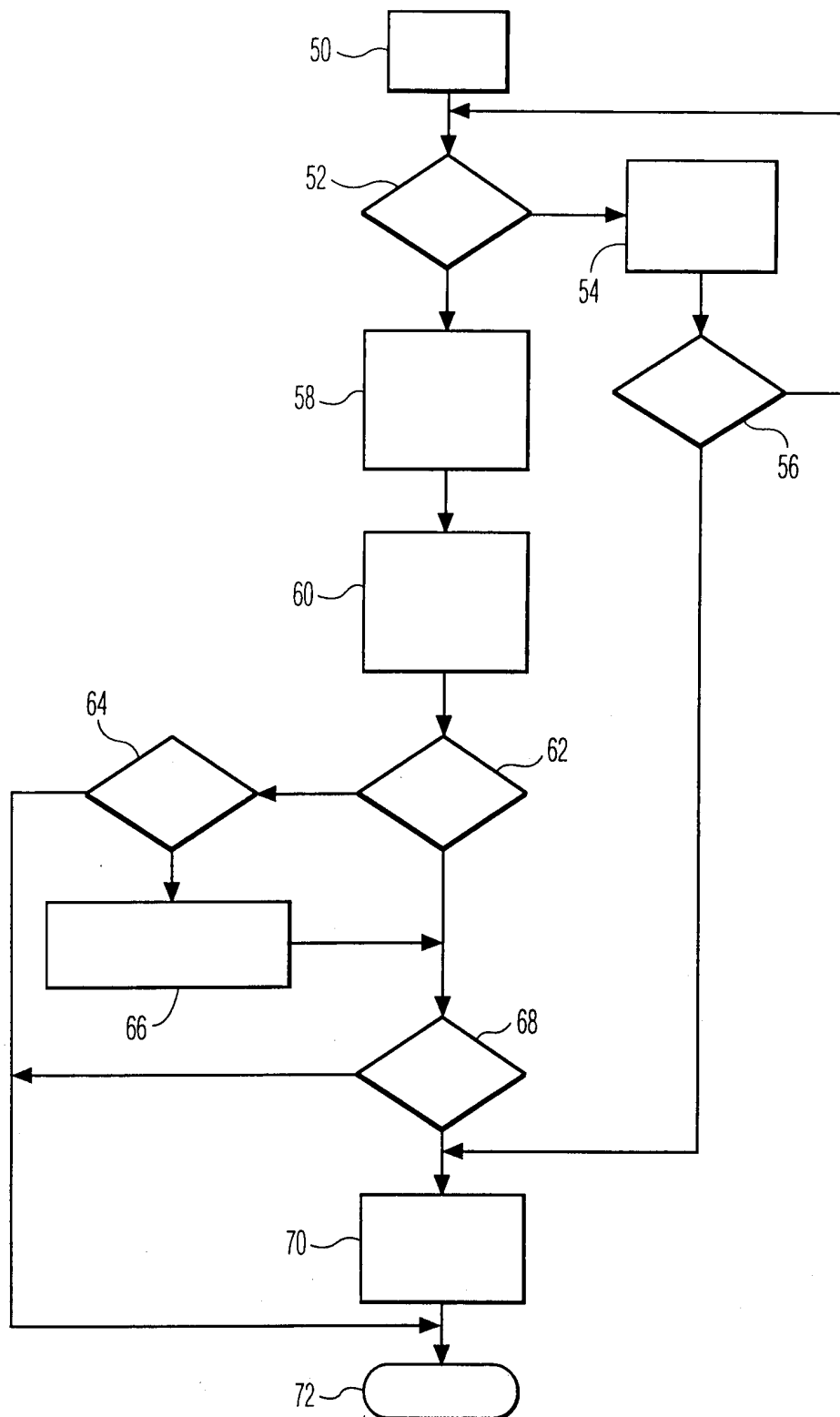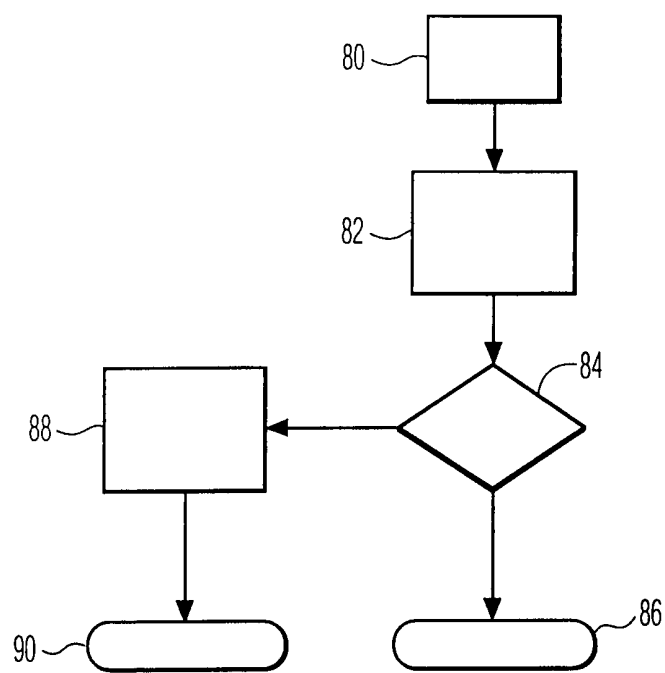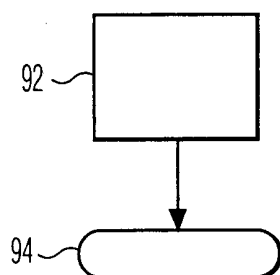
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FIG. 1

FIG. 2

FIG. 3

FIG. 4

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04N7/00   G06F17/30   H04H9/00

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)
IPC 7   H04N   G06F   H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 774 170 A (BEAUREGARD ROBERT G ET AL) 30 June 1998 (1998-06-30)	1,3,5,13
A	column 6, line 40 -column 8, line 43	2,4, 6-12,14

P,A	WO 00 07367 A (KONINKL PHILIPS ELECTRONICS NV ;PHILIPS SVENSKA AB (SE)) 10 February 2000 (2000-02-10) cited in the application page 20, line 14 - line 33 page 23, line 13 -page 24, line 3 page 26, line 10 - line 14 page 26, line 23 - line 26	1-14

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X	Further documents are listed in the continuation of box C.		X	Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
5 February 2001	12/02/2001

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INTERNATIONAL SEARCH REPORT

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 00 45291 A (KONINKL PHILIPS ELECTRONICS NV) 3 August 2000 (2000-08-03) cited in the application page 6, line 29 - line 34 page 17, line 25 -page 18, line 3 ---	1-14
A	EP 0 849 948 A (DISCOVERY COMMUNICAT INC) 24 June 1998 (1998-06-24) page 23, line 4 - line 39 ---	1,3
A	WO 95 15658 A (DISCOVERY COMMUNICAT INC) 8 June 1995 (1995-06-08) page 41, line 17 -page 42, line 10 page 43, line 1 -page 46, line 23 ---	1,3
P,A	WO 99 66719 A (WEBTV NETWORKS INC) 23 December 1999 (1999-12-23) the whole document -----	1-14

1

INTERNATIONAL SEARCH REPORT

.nformation on patent family members

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5774170	A	30-06-1998	NONE		
WO 0007367	A	10-02-2000	US	6100941 A	08-08-2000
			EP	1040656 A	04-10-2000
WO 0045291	A	03-08-2000	EP	1066577 A	10-01-2001
EP 0849948	A	24-06-1998	EP	0884907 A	16-12-1998
			EP	0912058 A	28-04-1999
			EP	0912059 A	28-04-1999
			EP	0920206 A	02-06-1999
			EP	0920207 A	02-06-1999
			EP	0910218 A	21-04-1999
			AT	192005 T	15-05-2000
			AU	692428 B	11-06-1998
			AU	5733294 A	04-07-1994
			BR	9307622 A	15-06-1999
			DE	69328441 D	25-05-2000
			DE	69328441 T	25-01-2001
			EP	0673581 A	27-09-1995
			JP	8506941 T	23-07-1996
			RU	2112325 C	27-05-1998
			AT	177277 T	15-03-1999
			AT	176840 T	15-03-1999
			AT	190180 T	15-03-2000
			AT	183352 T	15-08-1999
			AT	176841 T	15-03-1999
			AT	197366 T	15-11-2000
			AU	715683 B	10-02-2000
			AU	4440797 A	29-01-1998
			AU	712157 B	28-10-1999
			AU	4532597 A	05-02-1998
			AU	693775 B	09-07-1998
			AU	5732994 A	04-07-1994
			AU	692427 B	11-06-1998
			AU	5733094 A	04-07-1994
			AU	691479 B	21-05-1998
			AU	5733194 A	04-07-1994
			AU	5736394 A	04-07-1994
			AU	5845894 A	22-06-1994
			AU	5869894 A	04-07-1994
			AU	716184 B	24-02-2000
			AU	6066798 A	04-06-1998
			AU	716182 B	24-02-2000
			AU	6066898 A	04-06-1998
			BR	9307619 A	15-06-1999
			BR	9307620 A	10-08-1999
			BR	9307621 A	15-06-1999
			BR	9307623 A	16-05-2000
			BR	9307624 A	15-06-1999
			BR	9307625 A	31-08-1999
			CA	2151456 A	23-06-1994
			CA	2151457 A	23-06-1994
			CA	2151458 A	23-06-1994
			CA	2151459 A	23-06-1994
			CA	2151460 A	23-06-1994
WO 9515658	A	08-06-1995	US	5600364 A	04-02-1997

Form PCT/ISA/210 (patent family annex) (July 1992)

INTERNATIONAL SEARCH REPORT

.nformation on patent family members

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9515658 A		US 5798785 A	25-08-1998
		AT 197659 T	15-12-2000
		AU 693148 B	25-06-1998
		AU 1430695 A	19-06-1995
		BR 9408211 A	26-08-1997
		CA 2177153 A	08-06-1995
		DE 69426308 D	21-12-2000
		EP 0732031 A	18-09-1996
		EP 0963116 A	08-12-1999
		ES 2151590 T	01-01-2001
		JP 9510327 T	14-10-1997
		NZ 278185 A	27-04-1998
		US 6160989 A	12-12-2000
		AU 1333795 A	19-06-1995
		CA 2177154 A	08-06-1995
		EP 0732027 A	18-09-1996
		JP 9506225 T	17-06-1997
		WO 9515649 A	08-06-1995
WO 9966719 A	23-12-1999	AU 4681999 A	05-01-2000

Form PCT/ISA/210 (patent family annex) (July 1992)