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(54) Title: DISPLAY OF INTERACTIVE TELEVISION APPLICATIONS

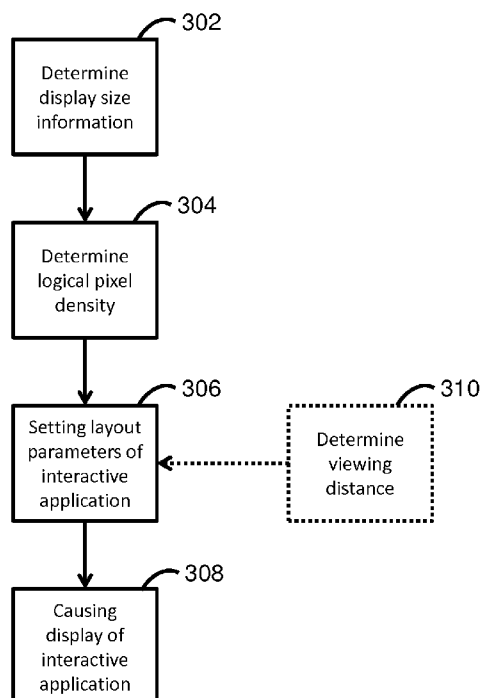


Fig. 3

(57) Abstract: The amount of information that can be usefully displayed on a display is determined by display parameters such as size and resolution. A method of generating a display of an interactive television application for display on a display device comprises determining display size information for the display device. Pixel density information for the display device is determined using resolution information for the interactive application and display size information. One or more display layout parameters of the interactive application are set in dependence on the pixel density information and the interactive application is displayed on the display device. In some embodiments, viewing distance is determined and used to set layout parameters.

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DISPLAY OF INTERACTIVE TELEVISION APPLICATIONS

- 5 The present disclosure relates to the display of interactive television applications, in particular although not exclusively on a television display device such as a television set.

BACKGROUND

- 10 Interactive television applications can be displayed on a wide variety of display devices, for example television sets, computer screens, portable devices such as mobile phones, tablets, laptops, etc. It is known in general to adapt interactive displays as a function of the display device, for example serving a different version of a website to a mobile device then to a desktop computer. It is also known to adapt the logical resolution (number of
15 pixels in each dimension) of a video signal as a function of the resolution available on the display device, using sub-sampling or interpolation as required, so as to be able to display the same video on different display devices.

- A number of quantities can describe the display of a display device, for example the
20 following quantities. A display device has a physical resolution (number of pixels in each dimension) and hence a physical pixel density given by the resolution relative to the physical size of the display device, as illustrated in Figure 1. For example pixel density may be calculated as the ratio of the square root of the sum of the respective squares of the number of pixels in each dimension divided by the screen diagonal lengths; the
25 number of pixels in one dimension divided by the length of that dimension; the average of the number of pixels in one dimension divided by the length of that dimension and the number of pixels in the other dimension divided by the length of that dimension, etc.

SUMMARY

- 30 While some degree of adaptation to the display device for the display of web sites or video signals is known, a more fine-grained approach would enable better use of screen real estate to better exploit the capabilities of the display device to convey information to a user of an interactive television application.

- 35 In a first aspect of the disclosure, there is provided a method of generating a display of an interactive television application for display on a display device. The method comprises

determining display size information for the display device. Pixel density information for the display device is determined using resolution information for the interactive application and display size information. One or more display layout parameters of the interactive application are set in dependence on the pixel density information and the interactive
5 application is displayed on the display device in accordance with the layout parameters.

Advantageously, by adjusting layout parameters based on pixel density information, the amount of information that can be displayed to a user of the interactive application can be adjusted by adjusting layout parameters to increase or decrease the amount of
10 information based on the available pixel density. Layout parameters that can be adjusted may comprise one or more of: font size; rows in a list; rows and/or columns in a grid; timescale of a grid guide; size of a PIP (picture in picture) window; etc.

For example, more rows of a television grid guide and a higher resolution time axis using
15 smaller fonts can be displayed on a high resolution large screen television set than on a television set of the same size having a lower resolution. Likewise, on screens having the same resolution (number of pixels in each dimension) more information can be displayed per unit of length on a smaller screen than on a larger screen. Thus, by considering pixel density and adjusting layout parameters accordingly, better use can be made of the
20 capacity of a given screen to display information than by, for example, merely adjusting video resolution based on the physical resolution of the display device.

In some embodiments, the resolution information comprises logical resolution information and the pixel density comprises a logical pixel density. The logical resolution is the
25 resolution of a display screen as generated by the interactive application, based on the number of pixels generated for the display screens of the interactive application. An interactive application may generate display screens at a logical resolution, which may correspond to the physical resolution of the display device for which the display screens are generated (in which case the logical resolution is the same as the physical resolution
30 of the display device) or not (in which case the display device will have to sub-sample or interpolate the display screens). For example, an interactive television application may generate a SD screen resolution display, while the display device may have a HD screen resolution. Corresponding to the logical resolution is a logical pixel density, that is the logical resolution relative to the physical size of the display device, calculated analogous
35 to the physical pixel density discussed above, for example using one of the various measures described above for the calculation of physical pixel density mutatis mutandis. It

will be understood that the logical pixel density may or may not be the same as the physical pixel density.

In some embodiments, the resolution information comprises logical resolution information
5 and physical resolution information (i.e. information about the resolution of the physical display screen, based on the number of physical pixels of the display screen). The physical resolution may be obtained in the same way as display size information.

Determining the logical pixel density may comprise using the lower of the logical and physical resolution to determine the logical pixel density, for example using one of the
10 various measures described above for the calculation of physical pixel density mutatis mutandis. Additionally or alternatively, generating displays of the interactive application may comprise setting the logical resolution to be the same, or to be the same or less than, the physical resolution.

15 In some embodiments, the display size information is determined using information obtained from the display device, for example in Extended Display Identification Data (EDID) format. Where the display device is separate from the device generating the display screens for the interactive application, this information may be obtained, for example, over a cable connecting the two devices, for example a HDMI cable. Where the
20 display device is sufficiently EDID compliant to provide the display size as part of the EDID, the display size information can be obtained directly from for example, the EDID information (or other information directly received from the display device).

In some embodiments, the display size information is derived from type or model
25 information about the display device. For example, type or model information can be derived from manufacturer name and serial number and/or product type information included in the EDID information or EDID information can be used directly as type or model information. Information identifying the model or type may be used to look up the display size in a database, for example over a communication network such as the
30 Internet. The database may be the entire World Wide Web and look up may comprise a web search.

In addition to setting the display layout parameters of the interactive application in dependence on the pixel density information, the layout parameters may be set in
35 additional dependence on information related to a viewing distance from a user of the interactive application to the display screen. The viewing distance may be a parameter that is stored for use in setting the layout parameters, for example subsequent to a setup

procedure in which the user specifies a value for the viewing distance. Alternatively or additionally, viewing distance information may be determined using a sensor.

For example, a camera such as a web camera, for example built into the display device,
5 the device generating the screens for the interactive application or a separate device, can be used to capture a scene in front of the display screen. The scene is processed to detect a face and the distance from the display screen to the face is inferred based on an average face size. Alternatively or additionally, a microphone and loudspeaker of one or more of these devices may be used to determine viewing distance using an echolocation
10 technique. A dedicated sensor may also be used instead or in addition to the above, for example an ultrasound sensor.

Viewing distance information may or may not be directly representative of viewing distance, as long as there is a sufficient correlation between the viewing distance
15 information and actual viewing distance to enable layout parameters to be set.

The interactive application may, for example, be an interactive television guide or electronic program guide (EPG), a social media application, a video on demand access application or an application combining one or more of these functions. The application
20 may run on a device separate from the display device, for example on a set-top box connected to a television set as a display device, or the two devices may be integrated, for example in a smart TV set.

In a second aspect of the disclosure, there is provided a method of generating a display of
25 an interactive television application for display on a display device. The method comprises determining viewing distance information related to a viewing distance of a user of the interactive application from the display device. One or more display layout parameters of the interactive application are set in dependence on the viewing distance information and the interactive application is displayed on the display device in accordance with the layout
30 parameters. Viewing distance information may be determined, for example, as described above.

In a third aspect, there is provided a device for generating a display of an interactive television application. The device comprises a memory for storing an interactive
35 application and one or more display layout parameters of the interactive application and a processor configured to implement one or more methods as described above. The device

may, for example, be a set-top box for connection to television set as a display, or other devices as described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

5

Specific embodiments are now described by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates calculation of pixel density in pixel per inch (ppi);

Figure 2 illustrates a system for displaying an interactive television application;

10 Figure 3 illustrates a method of displaying an interactive television application;

Figure 4 illustrates a method of obtaining display size information; and

Figure 5 illustrates a system for displaying an interactive television application comprising viewing distance sensors.

15 SPECIFIC DESCRIPTION

With reference to Figure 2, a set-top box 100 comprises a receiver 102 for receiving a broadcast signal, for example a terrestrial television signal, a satellite signal or a cable signal. A communications interface 104 is connected to a communication network, for example via a router. The communication network may be a local area network
20 connecting a number of devices and/or the Internet. A processor 106 comprises processing circuitry 108 and memory 110 and is connected to the communications interface 104 and the receiver 102 to process signals therefrom. The processing circuitry 108 comprises a number of modules, including modules for processing broadcast signals
25 (demultiplexing, decoding, etc) to generate a video signals corresponding to broadcast channels for display, for receiving and sending signals via the communications interface 104 and for running interactive applications, including generating display screens for the interactive applications. A display interface 112 is connected to the processor 106 to interface between the set-top box 100 and the television set 200 and to generate control
30 signals for controlling the display of the television set 200 to display the video and display screens generated by the processor 106. The modules of the processing circuitry 108 may correspond to different hardware devices or may correspond to logical modules of software (e.g. firmware) running on a general purpose or specialised processor. The processing circuitry thus can comprise any number of one or more processors and
35 devices and the modules may be distributed among these processors or devices in any convenient way ranging from all modules being implemented in a single processor or hardware device, for example a System on Chip (SoC), to each module being

implemented in a separate processor or hardware device. All described functionality can be implemented in any combination of dedicated hardware, general purpose hardware and suitable software.

- 5 The television set 200 comprises a display 202 for displaying video and display screens received from the set-top box 100, specifically from the display interface 112. The television set 200 further sends device information, for example in the EDID format, to the set-top box 100, which is received by the display interface 112 and passed to the processor 106 for processing.

10

The processor 106, as mentioned above, is configured for running an interactive application, for example a television program guide, and to generate display screens 204 of the interactive application for display on the television set 200. A method of generating such display screens and causing their display is now described with reference to Figure

15 3.

With reference to Figures 3, the processor 106 determines display size information, for example vertical and horizontal measurements of the display 202 at step 302. Display size information may be obtained directly, for example from an EDID signal received from the television set 200 or indirectly, for example by querying the memory 110, in which display size information has been stored during a setup procedure, for example entered by a user. In some embodiments, the display size is derived from the EDID signal and then stored in the memory 110 for later use as described above. An alternative method for determining display size information, either on the fly when required or for storage of the display size information in the memory 110 for later use is described below with reference to Figure 4.

At step 304, a logical pixel density is determined, that is a pixel density calculated for the logical resolution of the display screens generated by the interactive application relative to the physical display size, as described above for the physical pixel density with reference to Figure 1. At step 306 layout parameters of the interactive application are set based on the determined logical pixel density. The parameters are set so that the amount of information displayed is commensurate with the logical pixel density. For example, a high logical pixel density means that a smaller font size will be legible to a user of the interactive application, allowing smaller font sizes to be used and as a result to include more information in lists, etc in the display screens of the interactive application.

In some embodiments, the processor 106 also derives physical display resolution (the physical pixel resolution of the display device) in analogous manner as display size information. The physical display resolution may be used to adjust the logical resolution, for example to be less or equal to the physical display resolution. Alternatively or
5 additionally, the physical resolution may be used in determining the logical pixel density. For example, the logical pixel density may be calculated using the lower of the physical and logical resolution relative to the physical display size.

For example, the interactive application may be a television program guide having one or
10 more display screens in a grid guide format as depicted in Figure 2. The layout parameters of these display screens may be adjusted based on the logical pixel density so that more rows and columns are displayed for higher logical pixel densities. More generally, one or more of the following parameters of the interactive application are adjusted as a function of logical pixel density: font size; rows in a list; rows and/or columns
15 in the grid; timescale of a grid guide; size of a picture in picture (PIP) window.

Using the layout parameters set at step 306, the display screens of the interactive television application are generated based on these layout parameters and display of the interactive application on the display 202 is caused at step 308. The layout parameters
20 are used, in some embodiments, as inputs into CSS stylesheets to adjust the appearance of a browser based user interface dynamically. More generally, user interfaces coded to lay out the display against a set of rules rather than rigid pre-defined sizes and positions, in some embodiments, use the layout parameters to increase or decrease the amount of information or detail shown. For example there is approximately a 25% difference in pixel
25 density / height between a 32" and 42" television screen. If a row of an electronic program guide (EPG) is 200 pixel in height, it could be compacted by 40 pixels to 160 pixels in height through reduction of font size, spacing, etc. and yet will appear the same size on a 42" television at 160 pixels in height as on a 32" television at 200 pixels in height for the same viewing distance. The saving in vertical space would, for example, allow for a fifth
30 row of EPG to be displayed on the 42" television if 800 pixels of height were reserved for EPG row display.

With reference to Figure 4 an alternative method of determining display size information from information received from the television set 200, when that information does not
35 include display size information itself, can be used in some embodiments. At step 402, information received from the television set 200, for example in EDID format, is analysed to identify the model or identity of the television set, for example using manufacturer,

model and/or serial number information contained in the EDID signal. Using one or more of manufacturer, model and serial number information, or type model information derived therefrom, a device databases is accessed at step 404 to look up display size information for the television in question.

5

The database may be local to the set-top box 100 or may be accessed using the communication interface 104, for example over the Internet. In some embodiments, the database access may involve accessing a web search engine and searching for display size information in webpages on the World Wide Web. Once information about the

10 television set 200 in question has been located, display size information is determined for the television set 200 at step 406. That information may be used on the fly or stored for later use, as described above.

Returning to Figure 3, in some embodiments, the viewing distance (or information relating
15 to it), that is the distance at which a user of the interactive application views the display 202 of the television set 200, is determined at step 310 and step 306 of setting layout parameter(s) of the interactive application sets these parameters as a function of both determined logical pixel density and the determined viewing distance or viewing distance information. While the amount of information that can be displayed on the display screens
20 of the interactive application increases with the logical pixel density as discussed above, it will decrease with the viewing distance. Therefore, the parameters may be adjusted such that the amount of information displayed increases with logical pixel density and decreases with viewing distance.

25 For example, the parameters may be set such that font size increases with viewing distance and decreases with the determined logical pixel density. Some or all of the same parameters discussed above in relation to step 306 may be adjusted based on both logical pixel density and viewing distance. In some embodiments some parameters are adjusted based on both logical pixel density and viewing distance and some are adjusted
30 based on one of these. In some embodiments, some of the parameters are adjusted based on viewing distance and others based on logical pixel density.

The display layout parameters of the interactive application may be adjusted in numerous ways in line with the above considerations but the following table provides an example of
35 how the distance and/or logical pixel density may be taken into account in adjusting display parameters, with a "+" indicating a direct relationship, that is the parameter increases with increasing logical pixel density or viewing distance and a "-" indicates an

inverse relationship, that is the parameter decreases with increasing logical pixel density or viewing distance.

Layout Parameter	Logical Pixel Density	Viewing Distance
Font Size	-	+
Rows In List	+	-
Rows/Columns In Grid	+	-
Time Scale in Grid Guide	-	+
PIP Window Size	-	+

- 5 Some of these parameters are particularly relevant to EPG interactive applications but it will be appreciated that they are applicable to any interactive application displaying relevant elements.

Viewing distance (or viewing distance information) may be determined at step 310 in a number of ways. In some embodiments, the viewing distance is a parameter a user can set, for example during a setup procedure after set-top box. In some embodiments, the user can set the viewing distance on the fly, for example using a remote control, for example by entering a value for the viewing distance or by increasing or decreasing viewing distance using directional keys on the remote control as and when needed. In other embodiments, viewing distance (information) is derived from sensor signals. With reference to Figure 4, a number of possible sensor configurations are described.

In some embodiments, the set-top box 100 comprises a viewing distance sensor 114, dedicated to sensing viewing distance. The viewing distance sensor 114 may for example be an ultrasound sensor for sensing the distance to any nearest object in front of the set-top box 100 using the travel time of ultrasound reflections. The viewing distance sensor 114 is connected to the processor 106 provide the processor 106 with a viewing distance signal or a signal from which viewing distance can be derived for use at step 310.

In some embodiments, alternatively or additionally, viewing distance is determined using sensors on the television set 200. In some embodiments, a microphone 206 on the television set 200 is used to receive sound reflections of sounds generated by television set speakers under control of the processor 106. The sound reflections signals received by the microphone 206 are communicated to the processor 106, which is configured to determine viewing distance information based on echolocation techniques, for example based on reflection travel times or a frequency space analysis of the reflected sounds. In

some embodiments, a camera, for example a web cam 208 on the television set 200 is used to derive the distance information.

In such embodiments, the processor 106 receives images from the web cam 208 and applies a face detection algorithm to detect faces in the images. Based on the image size of the detected faces, optical characteristics of the web cam and typical face sizes, the processor 106 determines viewing distance as a quantity inversely proportional to the detected face size. For example, in some embodiments, the web cam 208 (or other integrated camera) has a fixed (e.g. in the bezel of the television set 200) or known position and the lens and sensor parameters of the camera are fixed or known. The face detection algorithm, in some embodiments, determines a bounding box for faces in the captured image and from the position of the camera, the lens and sensor parameters and the size of the bounding box a distance of the detected face from the camera is estimated using optical geometry, as is well known.

It will, of course, be understood that the processing described above in connection with the processor 106 to derive viewing distance information may also be carried out elsewhere, for example the television 200 may have a viewing distance determination module for determining viewing distance from the microphone 206 or web cam 208 and the television 200 may provide pre-computed viewing distance signals to the set-top box 100. Further, while a number of embodiments using different sources of information and signals for determining viewing distance has been described above, it will be appreciated that these sources and signals can be combined to determine viewing distance. Further, it will be appreciated that any viewing distance signal or information used in the methods described above need not actually be a viewing distance in terms of an actual distance of a viewer from the display screen as long as the signal or information is sufficiently related to viewing distance to enable the layout parameters to be set.

The following embodiments are also disclosed:

1. A device for generating a display of an interactive television application, the device comprising:

a memory for storing an interactive application and one or more display layout parameters of the interactive application;

a processor configured to:
determine display size information for a display device;

determine pixel density information for the display of the interactive application on the display device using resolution information for the interactive application and the display size information;

- 5 set the one or more display layout parameters of the interactive application in dependence on the pixel density information;
- cause the display of the interactive application on the display device.

2. A device according to item 1, wherein the resolution information comprises logical resolution information and determining the pixel density comprises determining a logical
10 pixel density.

3. A device according to item 2, wherein the resolution information comprises logical resolution information and physical resolution information and determining the pixel density comprises determining the logical pixel density based on the logical and physical
15 resolution information and the display size information, preferably using the lower resolution one of the logical and physical resolution information and the display size information.

4. A device according to any one of items 1 to 3, the processor being configured to
20 set the one or more display layout parameters of the interactive application in dependence upon the pixel density information and viewing distance information related to viewing distance of a user from the display device.

5. A device according to item 4, the process or being configured to determine
25 viewing distance information using information received from a sensor.

6. A device according to any one of items 1 to 5, wherein the layout parameters comprise one or more of: font size; rows in a list; rows and/or columns in a grid; time scale of a grid guide; size of a PIP window.
30

7. A device according to any one of items 1 to 6, wherein in the interactive television application is an interactive television guide.

8. A device according to anyone of items 1 to 7, wherein the device is a set-top box
35 and the display device is a television set.

9. A device according to any one of items 1 to 8, the processor being configured to determine display size information using information obtained from the display device

10. A device according to item 9, wherein the information obtained from the display
5 device identifies a type, make and/or model of the display device and determining display size information includes looking up the type, make and/or model in a database.

Having read the above specific description of some embodiments, it will be apparent to the person skilled in the art that many variations, modifications and juxtapositions of the
10 embodiments and features described above are possible and will fall within the scope of the appended claims. In particular, while the above description has been made in terms of a set-top box connected to a television set, it will be appreciated that other devices, such as computers, portable or otherwise, mobile phones, tablets, etc may be used to implement the respective functions of the set-top box and television set. Further, the
15 disclosure is not limited to implementations using separate devices but the functions of the set-top box and television set described above may equally be implemented in an integrated device, for example a smart TV set. In embodiments where separate devices are used, connection between the devices may be by cable, for example a HDMI cable, or a coaxial cable for frequency modulated signals, or by a wireless connection, for example
20 by a wireless router or wireless dongle of a smart TV. Other connections between devices, such as USB, ethernet or any other type of connection are equally envisaged.

CLAIMS

1. A method of generating a display of an interactive television application for display on a display device, the method comprising:
 - 5 determining display size information for the display device;
 - determining pixel density information for the display of the interactive application on the display device using resolution information for the interactive application and the display size information;
 - setting one or more display layout parameters of the interactive application in
 - 10 dependence on the pixel density information;
 - causing the display of the interactive application on the display device.
2. A method according to claim 1, wherein the resolution information comprises logical resolution information and determining the pixel density comprises determining a
- 15 logical pixel density.
3. A method according to claim 2, wherein the resolution information comprises logical resolution information and physical resolution information and determining the pixel density comprises determining the logical pixel density based on the logical and physical
- 20 resolution information and the display size information, preferably using the lower resolution one of the logical and physical resolution information and the display size information.
4. A method according to any preceding claim, the method comprising setting the
- 25 one or more display layout parameters of the interactive application in dependence upon the pixel density information and viewing distance information related to viewing distance of a user from the display device.
5. A method according to claim 4, the method comprising determining viewing
- 30 distance information using a sensor.
6. A method according to any preceding claim, wherein the layout parameters comprise one or more of: font size; rows in a list; rows and/or columns in a grid; time scale of a grid guide; size of a PIP window.
- 35
7. A method according to any preceding claim, wherein in the interactive television application is an interactive television guide.

8. A method according to any preceding claim, the method comprising determining display size information using information obtained from the display device

5 9. A method according to claim 8, wherein the information obtained from the display device identifies a type, make and/or model of the display device and determining display size information includes looking up the type, make and/or model in a database.

10 10. A device for generating a display of an interactive television application, the device comprising:

a memory for storing an interactive application and one or more display layout parameters of the interactive application;

a processor configured to:

determine display size information for a display device;

15 determine pixel density information for the display of the interactive application on the display device using resolution information for the interactive application and the display size information;

set the one or more display layout parameters of the interactive application in dependence on the pixel density information;

20 cause the display of the interactive application on the display device.

11. A device according to claim 10, wherein the resolution information comprises logical resolution information and determining the pixel density comprises determining a logical pixel density.

25

12. A device according to claim 10 or 11, wherein the processor is configured to implement a method according to any one of claims 1 to 9.

30 13. A device according to any one of claims 10 to 12, wherein the device is a set-top box and the display device is a television set.

14. A computer program product comprising coded instructions, which, when run on a processor, implement a method according to any one of claims 1 to 9.

35

15. One or more tangible computer readable media or memory devices storing coded instructions, which, when run on a processor, implement a method according to any one of claims 1 to 9.

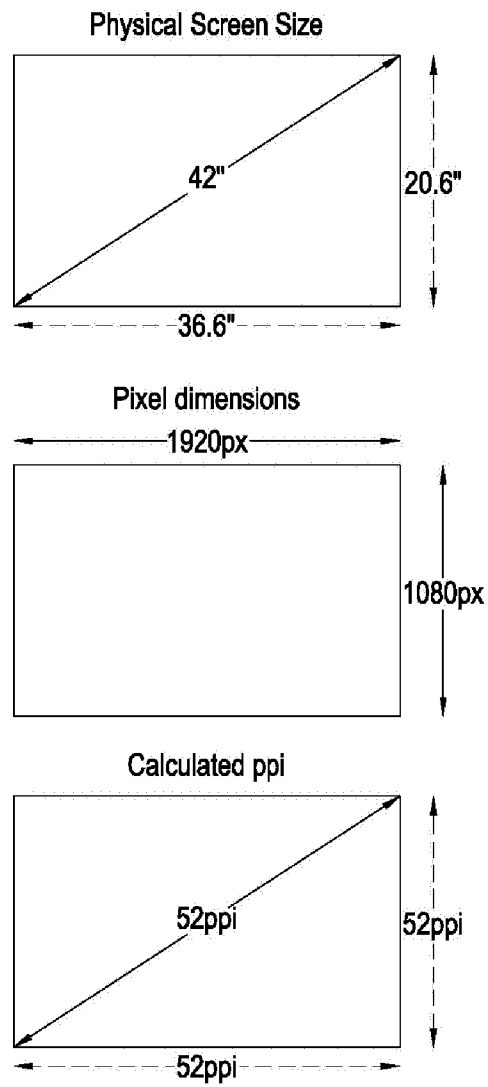


Fig. 1

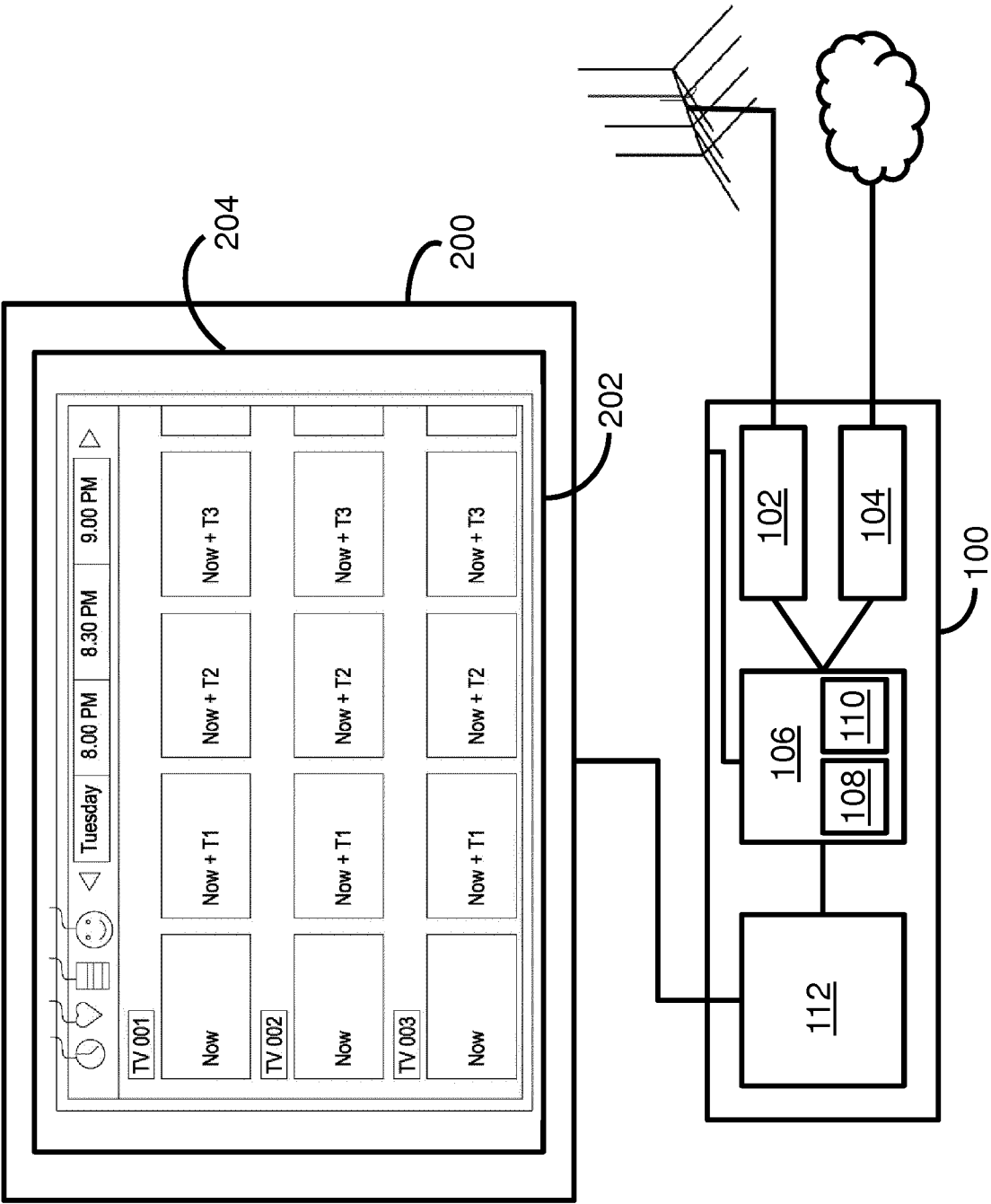


Fig. 2

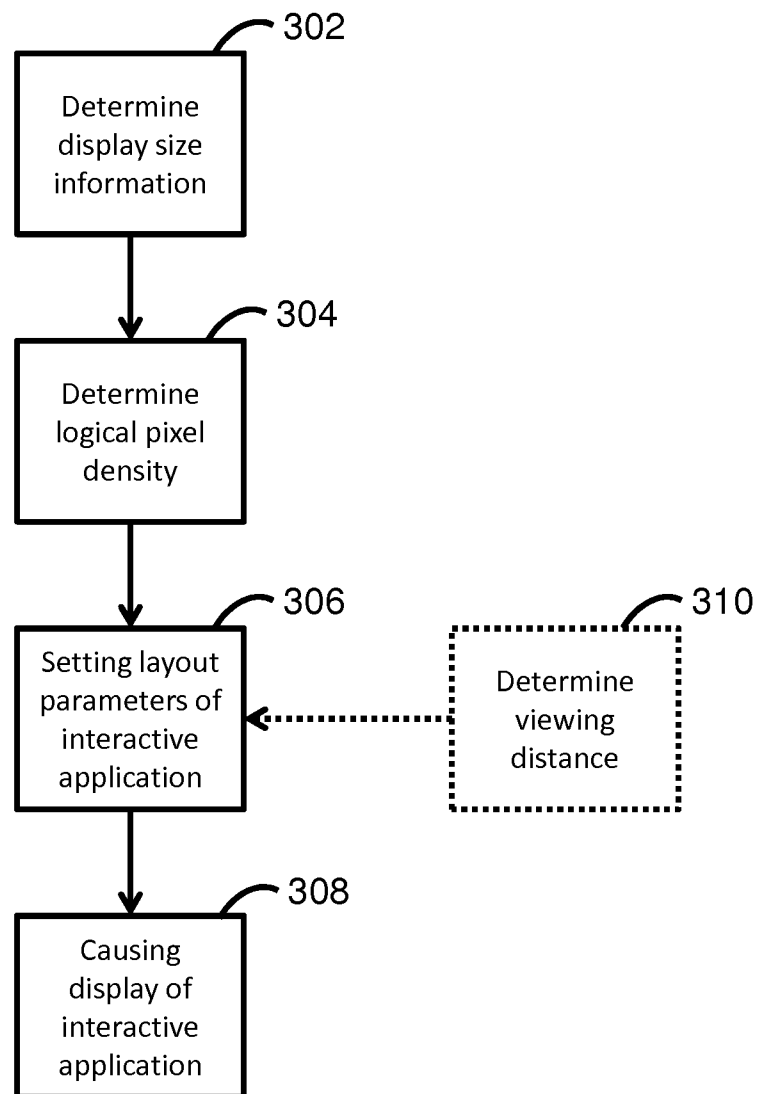


Fig. 3

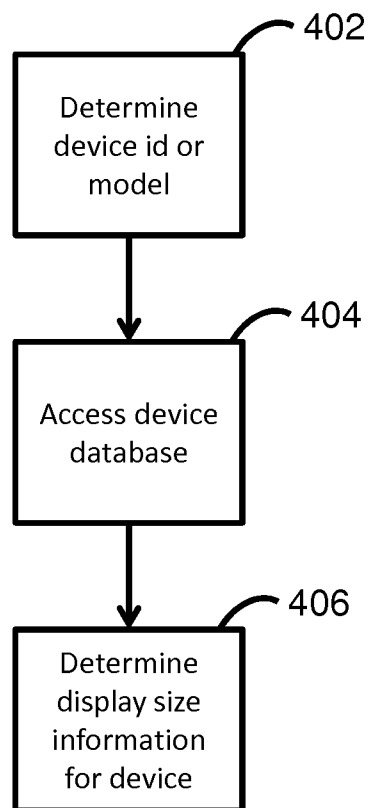


Fig. 4

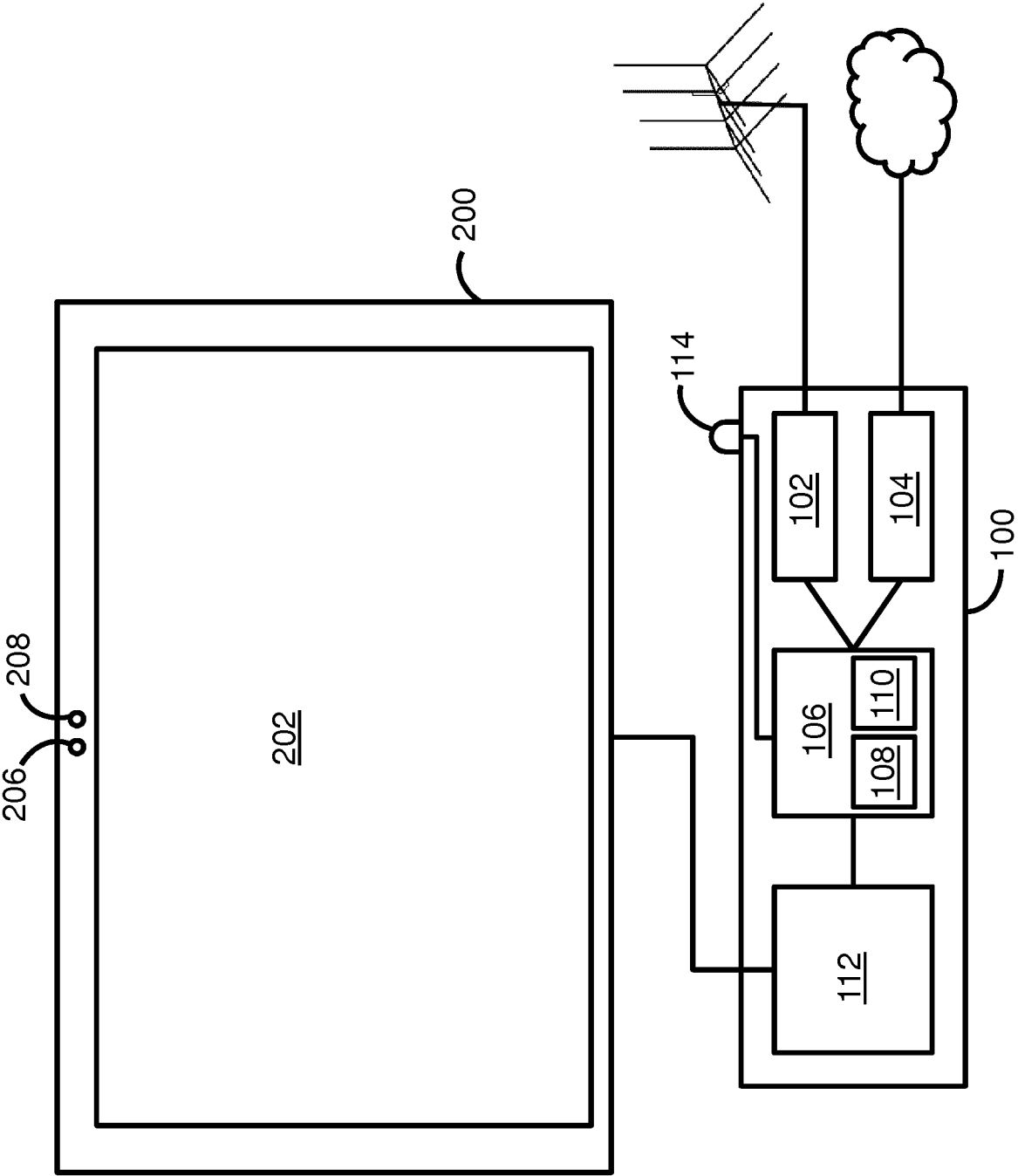


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/079685

A. CLASSIFICATION OF SUBJECT MATTER		
INV.	H04N5/445 G06F9/445	G09G5/14 H04N21/431
	G09G5/373 H04N21/442	G09G5/391 H04N21/45
	G06F9/44	
ADD.		
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) H04N G09G G06F		
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 practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 613 292 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 10 July 2013 (2013-07-10) paragraph [0014] - paragraph [0016] paragraph [0035] - paragraph [0040]; figure 1 paragraph [0044]	1-15
X	US 2013/027614 A1 (BAYER JASON [US] ET AL) 31 January 2013 (2013-01-31) paragraph [0027] - paragraph [0029] paragraph [0032] paragraph [0035] paragraph [0047] paragraph [0056] - paragraph [0060] paragraph [0079] ----- -/-	1-15
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 21 February 2017		Date of mailing of the international search report 01/03/2017
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Beaudoin, Olivier

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/079685

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A	US 2012/017172 A1 (SHETH SACHIN [US] ET AL) 19 January 2012 (2012-01-19) paragraph [0004] paragraph [0021] - paragraph [0025] paragraph [0031] paragraph [0041] -----	1-15

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