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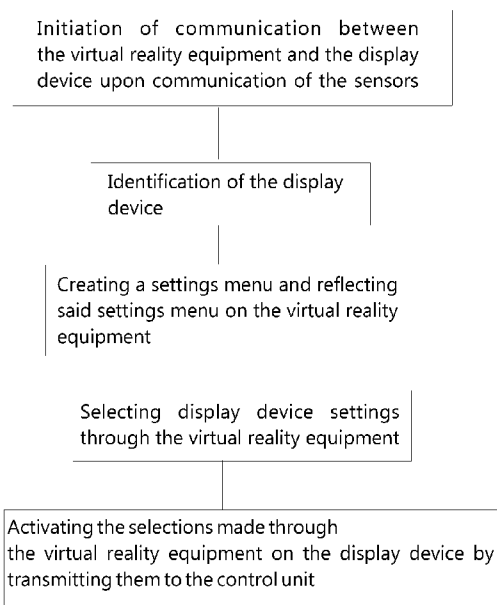
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(54) Title: REMOTE CONTROLLING METHOD OF A MULTIPLE SCREEN DISPLAY SYSTEM

Figure 1



(57) Abstract: The present invention relates to a method enabling remotely controlling a multiple screen display system formed to display source files on a plurality of display devices. In particular, the invention relates to a method in which display device settings are controlled by using virtual reality equipment together with sensors and control members provided on each display device in a multiple screen display system and capable of communicating with the virtual reality equipment.



Description**REMOTE CONTROLLING METHOD OF A MULTIPLE SCREEN DISPLAY SYSTEM**

- [0001] The present invention relates to a method enabling controlling the settings of a multiple screen display system formed to display source files on a plurality of display devices.
- [0002] The display devices display images on their screens, and combining a plurality of display devices so as to form a wide-screen display system called a multiple screen display, is a function achievable by simultaneously using a plurality of separate display devices together. In general, the multiple screen setup term implies generating a single screen image by means of a plurality of display devices, from a combined image transmitted from a single video inlet. Multiple screen displays may generally have 1x4, 2x2, 3x3, 4x4 or much larger screen arrangements.
- [0003] Essentially, multiple screen displays are preferred for being able to obtain a larger screen area by changing their arrangement, and a higher pixel intensity per unit cost, and they are advantageous due to production costs of single screens, thereby enabling achieving an extraordinary resolution when they are thus combined. Therefore, they are preferred in cases when high-resolution graphic content is played which are particularly favorable to be displayed on wide-screens.
- [0004] Virtual reality applications are part of the fields in which high resolution graphic content is frequently utilized. Virtual Reality (VR) technology is becoming more widespread as contents develop and devices supporting this technology become more accessible. Virtual Reality is a computer technology using virtual environment headsets or multi-projection environments sometimes together with physical environments or stages, in order to create realistic images, sounds or other perceptual elements simulating a user's physical presence in a virtual or imaginary environment. A person using virtual reality equipment can "look around" in a virtual world or can interact with virtual features or items by moving high-quality VR equipment. VR effect is created by headsets consisting of a head-mounted screen with the screen positioned across from a user's

eyes, but may also be generated by way of custom designed rooms having many wide-screen displays. However, since it is difficult to integrate a plurality of screens to a system and to control them, this is not preferred by users.

- [0005] In the state of the art patent document no. WO2008148291 the color values of an image content intended to be in a given ideal color combination value, are detected by a camera and stored in a memory module by means of a display device having a camera imaging system. The document discloses a method in which during playing of a video, the camera screen image color values are compared with the color values stored in the memory module and the image is calibrated with the ideal values when said values differ.
- [0006] State of the art patent document no. EP2599303 describes an operation method of a viewing apparatus enabling separate viewers to view separate content from a single image source.
- [0007] The aim of the present invention is to enable remotely controlling the settings of a multiple screen display system formed to display source files on a plurality of display devices.
- [0008] The multiple screen display system enabling realizing the method to achieve the aim of the present invention and disclosed in the first claim and the dependent claims, comprises a plurality of display devices connected to each other by a serial transmission line. The display area of the multiple screen display system can be expanded to a desired extent by connecting a desired number of display devices to each other so as to enable data communication in between. The display devices are enabled to communicate individually by means of a device sensor adapted for data communication, provided on each display device. At least one control unit is provided, controlling operation of the display devices within the multiple screen display system. The control unit may be provided on each display device, or may be connected so as to control a plurality of display devices from a single source. A virtual reality equipment is provided, comprising an equipment sensor communicating with the device sensors provided in the multiple screen display system. The virtual reality equipment further

comprises a screen adapted to reflect images thereon and a processor adapted to communicate with the control unit.

[0009] The remote controlling method of the invention comprises the steps of: the virtual reality equipment establishing wireless communication with the control unit and the device sensors provided on the display devices; identifying a related display device by means of the data coming from the device sensors provided on each one of the display devices; creating a settings menu by a command sent to the control unit of the identified display device and reflecting the created settings menu on the screen of the virtual reality equipment; selecting the settings of the display device through the settings menu by means of the virtual reality equipment processor; and activating the selections in the related display device by transmitting the selections to the control unit. The screen settings of a display device provided in a multiple screen display system are thus enabled to be easily controlled by a virtual reality equipment.

[0010] In an embodiment of the invention, the remote controlling method is executed by processing optical data received from the device sensor and the equipment sensor which have optical sensor features. In this embodiment, the device sensor and the equipment sensor form an optical detection mechanism. The signals sent by the sensors may be acoustic, optical or mechanical. The optical sensors utilize light to measure the position and the direction of a target. A signal emitter in an optical detection mechanism typically consists of a series of infrared LEDs. The sensors are cameras capable of detecting infrared light. The LEDs are illuminated in sequential pulses. The cameras capture the pulsing signals and send information to the processing unit of the system. Then, the processor processes the data to determine the position and the direction of the target. The equipment sensor and the device sensor forming the optical detection mechanism enable establishing a connection between the display device and the virtual reality equipment by way of wireless communication, and thereby provide guidance to establish a connection between the control unit of the display device and the processor to enable the display device's remote controllability.

- [0011] In an embodiment of the invention, the remote controlling method enables an image being played by the display devices to continue being played by a command of the control unit during reflecting the settings menu on the virtual reality equipment screen. This enables selecting screen settings such as color or brightness via the virtual reality equipment screen without interrupting the content being played, enhancing user viewing quality.
- [0012] In an embodiment of the invention, the remote controlling method comprises the step of selecting processor controls by means of a virtual reality equipment controller. The virtual reality equipment controller may have an integrated operating system, or may be an infrared controller adapted to send commands to the virtual reality equipment processor. In addition, portable equipment such as tablet computers or smart phones may also be used as a controller. This enables enhancing remote controlling efficiency by making it easier for a user to make a selection.
- [0013] In an embodiment of the invention, the remote controlling method comprises the steps of making selection settings through the processor and the equipment sensor communicating with a plurality of device sensors enabling screen settings of a plurality of display devices to be adjusted simultaneously, and the control unit applying the settings to the selected display devices.
- [0014] In an embodiment of the invention, the remote controlling method is executed by means of a virtual reality equipment which is a virtual reality headset. While ordinary headsets show a single image, 3D and Virtual Reality headsets comprise polarized lenses displaying two images, namely one for each eye. These images are employed in creating a perception of depth. More advanced versions of such headsets comprise head tracking systems. Such a system is connected to a computer sending signals to configure the images seen by a user while the user is walking through an environment. Many virtual reality headset types comprise a tracking system mapping movements of the user and configuring the images accordingly. Connection is established with the display device to which the user looks at, by means of the virtual reality headset and the sensors in the environment, and the application enabling adjusting the screen

settings of the display device is activated and reflected on the screen of the virtual reality headset. The user is enabled to easily control the screen settings simply by facing towards the screen.

- [0015] The invention enables remote controlling of display device settings by using virtual reality equipment controls together with one or more of the display devices in a multiple screen display system.
- [0016] The remote controlling method realized to achieve the aims of the present invention is illustrated in the accompanying drawing, wherein:
- [0017] Figure 1 is a remote controlling method diagram for a multiple screen display system.
- [0018] A multiple screen display system comprises a plurality of display devices having a serial transmission line in between, connected to each other by a serial video transmission line transmitting an image or video signal to an adjacent device, a device sensor adapted for data communication, provided on each one of the display devices, at least one control unit controlling operation of the display devices, and a virtual reality equipment having an equipment sensor communicating with the device sensors, a screen adapted for reflecting images thereon and a processor adapted for communicating with the control unit. In multiple screen applications, a separate cable connection is established for each one of the display devices in the system, enabling data communication with a central computer. Video distribution can be performed by various methods. In one of such methods, a central video distribution system is used, and each image to be displayed on a single display device is distributed by said central video distribution system. An image is appropriately split by the central system. Video transmission lines are formed by connecting all devices to the central distribution system. Since transmission lines have to be changed manually in case of a systemic problem occurring in any of the display devices or in case of occurrence of needs such as setting modifications, the devices and their connections have to be disassembled and reconfigured. The central system can be remotely controlled by various means but further operations are required to control individual display devices within the system. Such operations require physically

reestablishing the connections again or connecting the devices to a separate control device (Figure 1).

- [0019] The multiple screen display system of the invention comprises a remote controlling method comprising the steps of
- [0020] - the virtual reality equipment establishing wireless communication with the control unit and the device sensors provided on the display devices,
- [0021] - identifying a related display device by means of the data coming from the device sensors provided on each one of the display devices,
- [0022] - creating a settings menu by a command sent to the control unit of the identified display device and reflecting the created settings menu on the screen of the virtual reality equipment,
- [0023] - selecting the settings of the display device through the settings menu by means of the virtual reality equipment processor, and
- [0024] - activating the selections in the related display device by transmitting the selections to the control unit.
- [0025] By means of the remote controlling method, a virtual reality equipment is enabled to establish wireless connection with a device sensor on a display device and the control unit, thus easily controlling by means of the virtual reality equipment the screen settings of a display device in a multiple screen display system.
- [0026] In an embodiment of the invention, the remote controlling method is executed by processing optical data received from the device sensor and the equipment sensor which have optical sensor features. In optical sensors, a signal emitter typically consists of a series of LEDs. The sensors are cameras capable of detecting infrared light. The cameras capture the pulsing signals when the LEDs are illuminated with sequential pulses, and send information to the processing unit of the system. Then, the unit is able to extract the data to determine the position and the direction of the target. Optical systems have quick loading rates with minimized delay times. This enables establishing rapid connections between the virtual reality equipment and the display device, facilitating the control.
- [0027] In an embodiment of the invention, the controlling method enables an

image being played by the display devices to continue being played by a command of the control unit during reflecting the settings menu on the virtual reality equipment screen. In case there is a content played by being reflected on display device screens, the control unit activates the setting change selections by connecting to the control unit of the processor of a virtual reality equipment, the control unit enables the content being played to be continued without being interrupted. By this, since there is no selection screen obstructing the user from viewing an image during setting adjustments, viewing of the content continues and viewing experience of the user is thus improved.

[0028] In an embodiment of the invention, the controlling method comprises the step of selecting processor controls by means of a virtual reality equipment controller. If there is a control module provided in the controller, the controller may enable selection of display device screen settings by sending commands directly to the processor. If the controller does not comprise an integrated control module, it would have the feature of sending commands to the processor. Thus, the user is enabled to easily make setting selections via the selection menu.

[0029] In an embodiment of the invention, the remote controlling method comprises the steps of selecting settings through the processor and the equipment sensor communicating with a plurality of device sensors enabling screen settings of a plurality of display devices to be adjusted simultaneously, and the control unit applying the settings to the selected display devices. When controlling a plurality of display devices is selected through the virtual reality equipment, a single setting option is formed for all of the selected display devices. The preferred settings are applied to all of the selected display devices. Thus, when different screen sizes are preferred on different matrix structures, the settings of all of the display devices are enabled to be controlled.

[0030] In an embodiment of the invention, the controlling method is executed by means of a virtual reality headset of a virtual reality equipment. Connection with the display device to which the user looks at, is established by means of the virtual reality headset and the sensors in the environment, and the

application enabling adjusting the screen settings of the display device is activated and reflected on the screen of the virtual reality headset. The user is enabled to easily control the screen settings simply by facing towards the screen.

[0031] The invention enables remote controlling of display device settings by using virtual reality equipment controls together with one or more of the display devices in a multiple screen display system capable of communicating with the virtual reality equipment.

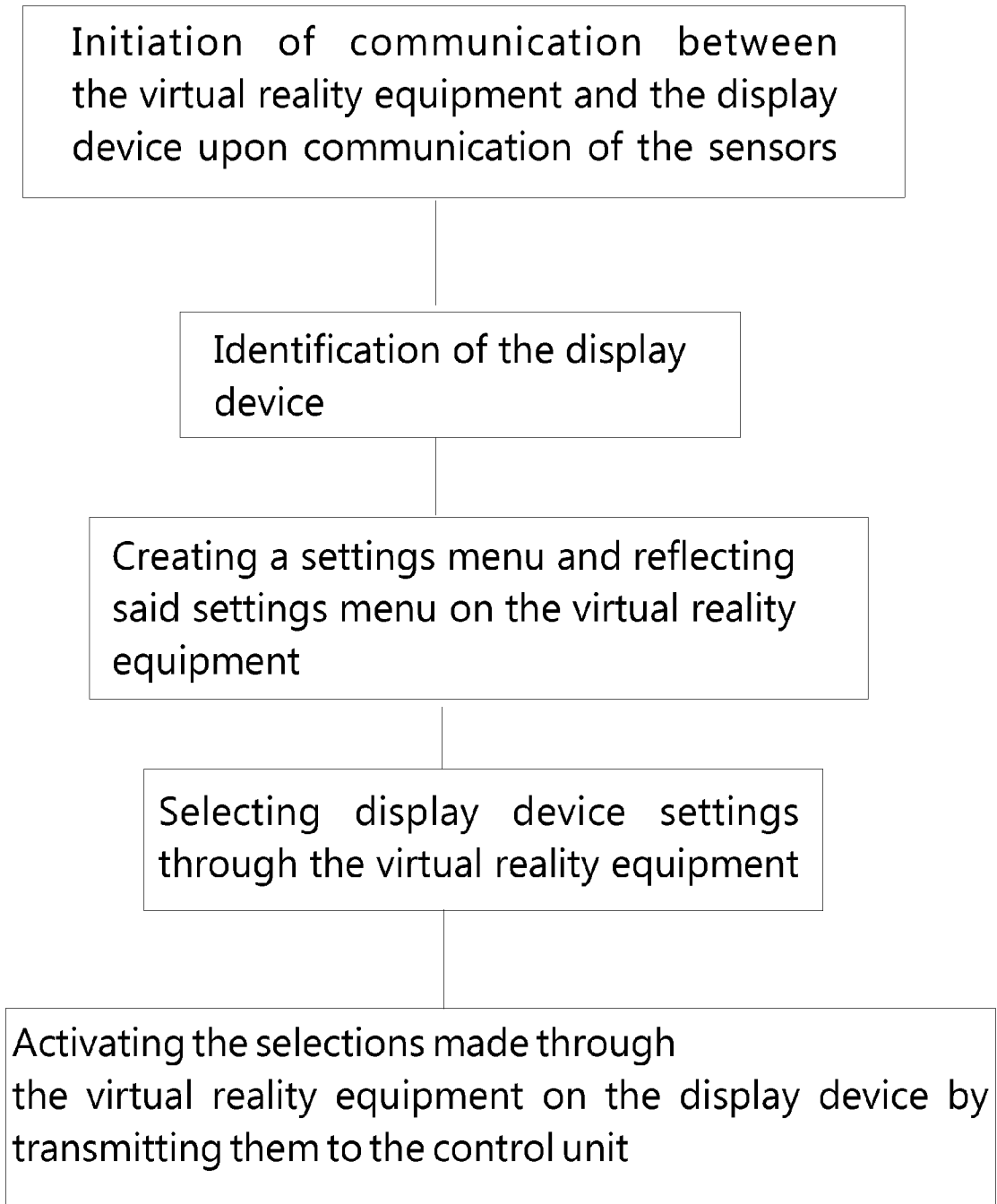
Claims

1. A remote controlling method executed in a multiple screen display system comprising a plurality of display devices having a serial transmission line in between, connected to each other by a serial video transmission line transmitting an image or video signal to an adjacent device, a device sensor adapted for data communication, provided on each display device, at least one control unit controlling operation of the display devices, and a virtual reality equipment having
 - an equipment sensor communicating with a device sensor,
 - a screen adapted for reflecting images thereon, and
 - a processor adapted for communicating with the control unit,the method **comprising the steps of**
 - the virtual reality equipment establishing wireless communication with the control unit and the device sensors provided on the display devices,
 - identifying a related display device by means of the data coming from the device sensors provided on each one of the display devices,
 - creating a settings menu by a command sent to the control unit of the identified display device and reflecting the created settings menu on the screen of the virtual reality equipment,
 - selecting the settings of the display device through the settings menu by means of the virtual reality equipment processor, and
 - activating the selections in the related display device by transmitting the selections to the control unit.
2. A remote controlling method according to claim 1, **characterized by** the device sensors and the equipment sensor being optical sensors.
3. A remote controlling method according to any one of the preceding claims, **characterized by** enabling an image being played by the display devices to continue being played by a command of the control unit during reflecting the settings menu on the virtual reality equipment screen.
4. A remote controlling method according to any one of the preceding claims, **characterized by** realizing the selecting of processor controls by a virtual reality equipment controller.
5. A remote controlling method according to any one of the preceding claims,

characterized by enabling: making selection settings through the processor and the equipment sensor communicating with a plurality of device sensors enabling screen settings of a plurality of display devices to be adjusted simultaneously, and applying the settings to the selected display devices by transmitting the selections to the control unit.

6. A remote controlling method according to any one of the preceding claims, **characterized by** the virtual reality equipment being a virtual reality headset.

Figure 1



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/057588

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/14 G09G5/00 H04N21/485 H04N9/31
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)
G06F H04N G09G
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.
Y	US 2018/084234 A1 (YAMAMOTO TAKEKUNI [JP] ET AL) 22 March 2018 (2018-03-22) figures 1,2 paragraph [0131] - paragraph [0132] paragraph [0143] - paragraph [0146] paragraph [0075] - paragraph [0082]; figures 1,2	1-6
Y	US 2011/234896 A1 (IVASHIN VICTOR [US] ET AL) 29 September 2011 (2011-09-29) paragraph [0017] paragraph [0034]; figures 1,2	1-6

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	"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
"E" earlier application or patent but published on or after the international filing date	"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
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2018084234 A1	22-03-2018	CN 107864367 A	30-03-2018
		JP 2018050144 A	29-03-2018
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