159159

Method and System for Depicting Digital Display Elements

The subject matter of the present invention relates to a method and a system for visualizing digital display elements on a plurality of display devices wherein the visualization of display elements takes place in a chronologically and spatially coordinated manner on a first display device and the visualization of display elements on at least one additional display device and wherein the display elements are connected to one another.

The present invention relates to the area of digital information systems in which texts, images and videos or acoustic information are visualized by means of computers as display elements on displays and/or are output on an acoustic display device in a manner attuned to one another. For the display, the texts, images and videos are available predominantly or exclusively in digital form. To be able to visualize digital display elements on a display device, such as a monitor or screen, the digital information must first be transformed by a computer display device, i.e., a (multimedia) computer dedicated to the display and having relevant software, into signals for the display device. As a rule, these signals have a graphic card and/or acoustic card format. If a plurality of display devices are to display the same digital information at the same time, it suffices for the image and/or sound signal generated by the computer display device to be reproduced via so-called Y-switches and to be transmitted to the display devices that are connected to the computer display device.

On the other hand, it is considerably more complicated if digital display elements are to be visualized on a plurality of display devices, all of which are connected to the dedicated computer display device, in a chronologically coordinated manner, i.e., in a manner attuned to one another. In addition to transforming the digital display elements to be visualized into image and/or sound signals for the display devices that are connected to the computer display device, it is necessary to specify the chronological sequence of the signals and the target address that must be maintained to ensure a chronologically and/or spatially coordinated visualization of the information to be visualized on the respective display devices.

In the prior art, if a plurality of different digital display elements were to be visualized at different times on the display devices that are connected to the computer display device, the display elements intended for visualization, together with the respective information that specifies the time or location of visualization, had to be analyzed by the computer display device in order to prepare a time sequence plan. The time sequence plan determined which specific information to be visualized was to be displayed at which time and on which display device and/or in which manner.

Specifying or controlling the chronological sequence of the display elements that are to be visualized on the respective display devices and, in particular, generating the image and/or sound signals is computationally very complex. This computational complexity is responsible for

G00002

the fact that the image quality or the resolution of the display elements visualized on a display device is extremely limited. The use of computer display devices with a greater computing capacity would entail a considerably higher cost of investment.

The problem to be solved by the present invention is to make available a method and a system for the visualization of digital display elements, by means of which method and system it is simple and inexpensive to visualize the display elements with high accuracy and chronologically attuned to one another on a plurality of display devices without the disadvantages listed above.

To solve the problem defined above, a method according to the present invention of the type discussed earlier provides that a minimum of one computer display device, preferably a plurality of computer display devices, and one control computer device that is connected to the computer display devices be made available and that each computer display device have a minimum of one display device dedicated to it, with a minimum of one display element in a file

format and/or a minimum of one reference to a file containing or representing the display element and a minimum of one control information being transmitted to the control computer device, with the control information determining the point in time and/or the location of the display of the display element on a display device, with the control computer device generating a minimum of one control command from the control information, with the display element and/or the reference and the control command being transmitted by the control computer device to the computer display device, and with signals in a graphic card and/or acoustic card format being generated as a result of the control command by the computer display device from the file containing the display element and being transmitted to the respective dedicated display device.

In contrast to prior-art methods for the chronologically and/or spatially coordinated visualization of display elements on a plurality of display devices, the method according to the present invention provides that the specification of the chronological sequence of the digital display elements that are to be visualized in a coordinated manner on a plurality of display devices and the transformation of the information to be visualized into input signals for the respective display devices take place on two different computer devices independent of the program and preferably also independent of the hardware. This has the advantage that the computing capacity required to generate control commands for specifying the chronologically coordinated sequence of the digital display elements to be visualized on the respective display devices is provided by the control computer device while making it possible for the computing capacity of the computer display device to be fully utilized to carry out the transformation of the display elements existing in a file format into image and/or sound signals for the display devices. The point in time at which a computer display device transmits a signal to a specific display device to visualize the digital display elements and the target address by means of which the location of the display is identified are determined by a minimum of one control command that is generated by the control computer device and transmitted to the computer display device.

The control command provides the computer display device with information about the point in time at which an image and/or sound signal is/are to be generated from the display element on hand in a file format and is/are to be transmitted to the display device to ensure that

the display element is visualized or displayed at a specific point in time in the specific location on the display device desired. To implement this, the control computer device is connected to all computer display devices. Each computer display device is preferably connected to a display device. In such a case, it is possible to visualize, in a coordinated manner, the digital display elements on all display devices that are connected to the control computer device via the computer display devices.

But in principle it is also possible for a computer display device to be connected to a plurality of display devices, thus making it possible to visualize the same digital information or display elements at the same time on all display devices that are connected to the computer display device. To implement this, for example, a prior-art Y-switch of the type described earlier can be used to reproduce the image and/or sound signals generated by the computer display device and to transmit said signals to the display devices that are connected to the computer display device. In addition, so-called splitter computers can be disposed downstream of the computer display device, which splitter computers make it possible to distribute, in a coordinated manner, input signals in the graphic card format with limited resolution to a number of different display devices.

A display element can be anything which, when visualized on the display device, is perceived by the viewer as a unit, e.g., a commercial comprising a plurality of sequences, but also any files that are combined to form a unit, e.g., images or MPEGs of a commercial. A digital display element can invariably contain both graphic and acoustic elements, but in the simplest case, a display element can be a single piece of graphic and/or acoustic information.

The display elements and/or references thereto are preferably transmitted together with the control command by the control computer device to the computer display device. The computer display device simply serves to generate image and/or sound signals from the display elements on hand in one file or a plurality of files. The simultaneous transmission of the control

commands together with the coordinated digital display elements has the advantage that the computer display device, as soon as it receives the control command, can immediately generate the signals for the display device, without the need for saving or storing the display elements on the computer display device.

It is, however, also possible for the display elements to be saved or stored as a file in the memory of a storage device of the computer display device. In this case, the transmission of the control command is independent of the transmission of the display element files. As soon as the control command has been transmitted to the computer display device, the display element files associated with the control command can be loaded from the memory of the computer display device. This is of particular advantage in cases in which the same display elements on the computer display device are to be transformed a number of times into signals for the display device or in which a rapid data transmission is desired.

And finally the control computer device can be made to transmit a digital reference or a path specification together with the control command to the computer display device, in which case the reference of the computer display device enables access to a file containing the display element. In such a case, the display elements to be visualized can be stored, for example, in a memory of the control computer device and/or in an external central memory. This is especially useful in cases in which large quantities of data are to be visualized.

The control command generated by the control computer device can be transmitted to the computer display device as a single control command or in combination with a plurality of additional control commands in a control command block. The transmission as a control command block is useful, for example, when parallel effects or a "blinking light" effect is desired during the display of the display elements. The control commands and/or the display elements and/or the references can be transmitted both to the control computer device and to the computer display device in the form of a file or in the form of network packages. It should moreover also be noted that a plurality of display devices can be configured in a spatial interconnection in a

manner readily visible to a viewer. In this situation, the invention is especially useful and important.

According to an especially preferred embodiment of the invention, a plurality of display elements and/or references and control information are compiled in a play list and said play list or individual display elements and/or references and control information are transmitted to the control computer device. In the play list, the display elements to be visualized over a predetermined period of time can be shown in the form of a sequence plan. After the transmission of the play list to the control computer device, said play list is analyzed by the control computer device and, in accordance with the chronological and/or spatial coordination of the display elements to be visualized within the play list, control commands are and/or references are generated for the display of the display elements compiled in the play list and transmitted to the computer display devices. Preferably, the play list is also available in the form of a file format, with the possibility of easily generating different play lists for different display devices and different times of display from a so-called master play list.

The computer display devices and the control computer devices are preferably integrated into a network, for example, into an intranet. The transmission of information between the control computer device and the computer display device is preferably carried out via a permanent or continuous information transmission line.

To visualize the same digital display elements and/or program blocks on at least two display devices, it is possible according to the present invention to store the same display device on at least two computer display devices or to transmit the same display elements to at least two computer display devices. To simultaneously visualize the same information on the display devices, the same control commands can also be transmitted by the control computer device to the relevant computer display devices.

The chronological and/or spatial coordination of the information to be visualized or of the display elements can be implemented in different ways. Preferably, the control command is transmitted as close in time to, i.e., immediately prior to, the desired display of the display element. In the simplest case, the control command is an instruction to the computer display device, such as "Now display display element x." To ensure that loading the display elements does not lead to a delay in the active memory of the computer display device, the control computer device can use a so-called load command to transmit the display elements and thus make them available in the active memory of the computer display device even prior to the specified time of display. In this case, the control command "Load display element x" is transmitted for each display element a certain time in advance and the additional control command "Now display display element x" is subsequently transmitted in time for the playing time. It is also possible to configure the control command in such a way that a display command is transmitted simultaneously with a load command and that on transmission, information that specifies the delay in time until the display element is to be displayed is transmitted at the same time. In this case, the control command reads, for example, "Now load digital display element x and display display device x after lapse of time y."

In addition, it is also possible for the computer display devices to be synchronized to a reference time and for a control command to cause an image and/or sound signal to be generated from a display element file at a predetermined time relative to the reference time. Irrespective of the potential combination with the control command that causes the display element to be loaded, the control command that causes the signal to be transmitted and/or the display element to be visualized on the display device is provided with an absolute time marker or is referenced to the reference time. To ensure the coordinated visualization of the display elements on the various display devices, it is necessary to use an absolute time marker in order to synchronize the computer devices involved in the system to the timer marker selected or to the reference time.

To enable the chronological coordination of the display elements to be visualized on the display devices with a higher degree of accuracy, it is possible according to the present invention

to provide that the time between the beginning of the transmission of a control command and/or the end of the procedure of loading the display element and/or the transmission of an image and/or sound signal and/or the visualization of the display element on the display device be automatically determined and, during future transmissions, to be automatically taken into consideration by means of some type of a closed-loop control system. In this context, it is useful to ensure that during the transformation of the display elements to be visualized into signals and/or during the visualization of the display elements on the relevant display device, a control signal can be transmitted to the control computer device. The point in time at which the display elements are visualized during future transmissions on the relevant display device can thus be controlled as a function of the period of time determined and/or of the control signal transmitted,

The display devices are preferably visibly configured in a spatial interconnection, with the coordinated visualization of the digital information being immediately visible to a viewer. For example, a plurality of display device can be configured in a series, with specific image elements being displayed on various display devices. It is thus possible to visualize display patterns on the display devices that are disposed in a spatial interconnection. For example, at time t_1, the first, the third and the fifth display device can display a red image while a green image is visualized on the second, the fourth and the sixth display device. At time t_2, the reverse color pattern is to be displayed on these six spatially interconnected display devices. According to a second simple example, a graphic display element, such as a red image, passes within a short time from the first to the last display device. The coordinated sequences of the display elements to be visualized and/or of a play list can be as complex as desired.

In principle, however, it is also possible for a plurality of display devices to be disposed separately from one another in several rooms or in different locations. For example, in a first room, a viewer can view a first sequence of a film at time t_1 and a second sequence of the film in a second room at time t_2. In this case, the difference in time between the playing time of the first sequence and that of the second sequence can preferably be precisely adjusted to the average

period of time that it takes the viewer to walk from the first room to the second room. Thus, in spite of the different rooms, the viewer will see a seemingly continuous sequence of the film.

By way of an example, a potential embodiment of the method according to the present invention will be described on the basis of the drawing below.

The drawing shows a simplified representation of an embodiment of the method according to the present invention for visualizing digital display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} on a plurality of display devices 1. The elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} can be, for example, individual texts, videos or images or combinations thereof and sequences therefrom which are compiled for future playing along the lines of a program in a play list 2. Play list 2 is a file in which the display elements a_{1-n}, b_{1-n}, c_{1-n} and d_{1-n} or references thereto are contained in a file format. Play list 2 is compiled along the lines of a sequence plan, in which a control information t_a, t_b, t_c, t_d is dedicated to each display element a_{1-n} to d_{1-n}. Control information t_a to t_d specifies at which point in time and on which display device 1 a display element a_{1-n} to d_{1-n} is to be displayed. In addition, said control information can also contain the position on the screen and the overlay effect for the display elements.

According to the embodiment shown in the drawing, play list 2 is transmitted to a control computer device 3. The control computer device 3 analyzes play list 2, with the control computer device 3 generating a relevant control command x_a to x_d from each control information t_a to t_d, which control command, like the relevant control information, specifies at which point in time and on which display device the individual display elements are to be displayed. In addition, via the control command, it is possible to control the position on the screen and the overlay effect for the individual display elements. The control computer device 3 transmits the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} together with the generated control commands x_a to x_d to a plurality of computer display devices 4. Based on the control command x_a to x_d, the relevant computer display device 4 generates from the file containing the display element a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} image and/or

sound signals 5 for the display or output of the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} which are subsequently transmitted to the properly dedicated display device 1. This ensures that the chronological coordination of the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} specified in the play list is properly taken into consideration while the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} are being played. This means that the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} contained in play list 2 will be displayed or output at a predetermined time according to a predetermined sequence plan. Thus, the chronological and/or spatial coordination of the display elements a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n} is simple and can be easily implemented.

The control computer device 3 can control one or a plurality of computer display devices 4. Although not shown in the drawing, it is in principle also possible to provide that in cases in which there is a plurality of computer display devices, one of these assume the function of the control computer device for all other computer display devices. To implement this, the control computer device 3 and the relevant computer display devices 4 have appropriate data processing programs, i.e., the software for the control computer device 3 is a so-called play list analyzer and the software for the computer display devices 4 is a so-called element player.

In this manner, the play list analyzer can control one or a plurality of element players. In principle, the play list analyzer and the element players can be installed as independent programs on the same computer or the same computer device. Preferably, however, the play list analyzer is installed on a separately dedicated computer. This ensures that the computer with the play list analyzer and each computer with an element player use the technically maximum available capacity for each task and, if needed (e.g., during repairs), can be easily replaced.

Claims

1. A method for the visualization of digital display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on a plurality of display devices (1), wherein the visualization of display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on a first display device (1) and the visualization of display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on a minimum of one additional display device (1) takes place in a chronologically and/or spatially coordinated manner and wherein the display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) are connected to one another, characterized in that a minimum of one, preferably a plurality of computer display devices (4), and a control computer device (3) connected to said computer display devices (4) are provided, and that each computer display device (4) is associated with a minimum of one display device (1), with a minimum of one display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) in a file format and/or a minimum of one reference to a file containing the display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) and a minimum of one control information (t_a, t_b, t_c, t_d) being transmitted to the control computer device (3), with the control information (t_a, t_b, t_c, t_d) specifying the point in time and/or the location of the display of the display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on a display device (1), with the control computer device (3) generating a minimum of one control command (x_a, x_b, x_c, x_d) from the control information (t_a, t_b, t_c, t_d), with the display element (1) and/or the reference and the control command (x_a, x_b, x_c, x_d) being transmitted by the control computer device (3) to the computer display device (4), and with signals (5) in a graphic card and/or acoustic card format being generated as a result of the control command (x_a, x_b, x_c, x_d) by the computer display device (4) from the file containing the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) so as to display or output the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) and being transmitted to the associated display device (1).

2. The method as in Claim 1, characterized in that a plurality of display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) and/or references and control information (t_a, t_b, t_c, t_d) are compiled in a play list (2) and that the play list (2) or separate display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) and/or references and control information (t_a, t_b, t_c, t_d) are transmitted to the control computer device (3).

3. The method as in Claim 1 or 2, characterized in that the play list (2) is analyzed by the control computer device (3), with control commands (x_a, x_b, x_c, x_d) being generated for the display of the display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) compiled in the play list (2) and/or references thereto.

4. The method as in any one of the preceding claims, characterized in that the computer display device (4) and the control computer device (3) are integrated into a network, preferably into an intranet.

5. The method as in any one of the preceding claims, characterized in that the same display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) are stored on a minimum of two computer display devices (4) or that the same display elements (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) are transmitted to a minimum of two computer display devices (4).

6. The method as in any one of the preceding claims, characterized in that the control command (x_a, x_b, x_c, x_d) is transmitted close to the time of the desired display of the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) to the computer display device (4).

7. The method as in any one of the preceding claims, characterized in that a first control command causes a file containing a display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) to be loaded on the computer display device (4) and/or that a second control command causes the signal (5) to be transmitted by the computer display device (4) to the display device (1) and/or causes the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) to be displayed on the display device (1).

8. The method as in any one of the preceding claims, characterized in that the first control command and the second control command are transmitted so as to be staggered by a period of time or that the first control command and the second control command are transmitted simultaneously, with the second control command causing the signal (5) to be transmitted and/or the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) to be displayed on the display device (1) after a predetermined period of time has elapsed after the transmission of the second control command.

9. The method as in any one of the preceding claims, characterized in that a plurality of computer display devices (4) are synchronized to a reference time and that the second control command causes the signal (5) to be transmitted at a predetermined time.

10. The method as in any one of the preceding claims, characterized in that the period of time between the beginning of the transmission of the control command and/or the end of the procedure of loading the display element and/or the transmission of the signal (5) and/or the display of the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on the display device (1) is automatically determined.

11. The method as in any one of the preceding claims, characterized in that during the generation of a signal (5) and/or during the display of the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) on the relevant display device (1), a control signal is transmitted to the control computer device (3).

12. The method as in any one of the preceding claims, characterized in that the point in time at which the display element (a_{1-n}, b_{1-n}, c_{1-n}, d_{1-n}) is displayed on the relevant display device (1) is controlled by the control computer device (3) as a function of the period of time determined and/or as a function of the control signal.

13. A system for carrying out the method according to any one of the preceding claims, characterized in that one computer display device (4), preferably a plurality of computer display devices, and a control command (3) connected to the computer display devices (4) is/are provided and that each computer display device (4) is associated with a minimum of one display device (1).