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(51) INT CL:  
**G06T 11/60** (2006.01) *G06T 13/00* (2006.01)

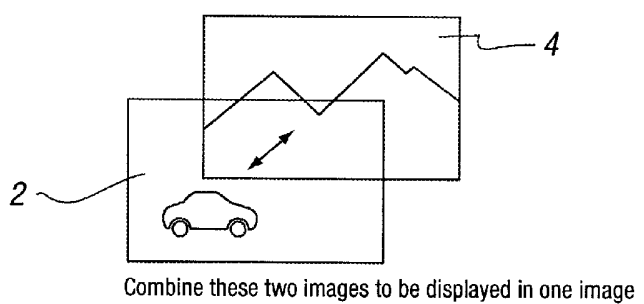
(52) UK CL (Edition X ):  
**H4T TCHD**

(56) Documents Cited:  
**GB 2246933 A** **EP 1107605 A**  
**EP 0828232 A2** **US 6185342 B1**

(58) Field of Search:  
 UK CL (Edition X ) **H4T**  
 Other: **Online: WPI, EPODOC**

(54) Abstract Title: **Image composition and animation using layers**

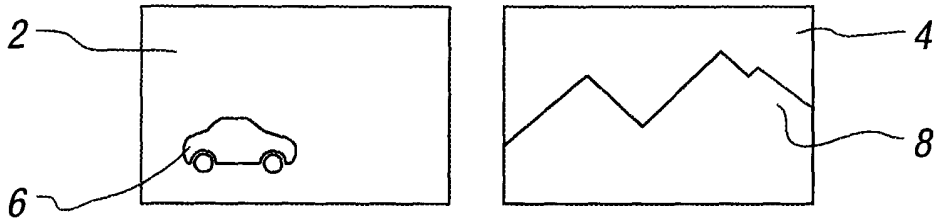
(57) The invention relates to the display of an animated image sequence on a display screen using one or a combination of image display methods to cause the animation. The methods include: The generation of a display from a series of image layers, and the selected alteration or change of one of said image layers to cause a change in the image, the selective display of only a portion of the image on the display screen and the alteration of the selected portion and/or the use of image vectors to provide a magnification or reduction in the image display. Typically the image display which is to be created at any given time, is in response to user selections and/or game control signals. The invention is intended to be applied to small display screen devices such as PDAs, mobile telephones or handheld gaming devices.



**FIG. 1b**

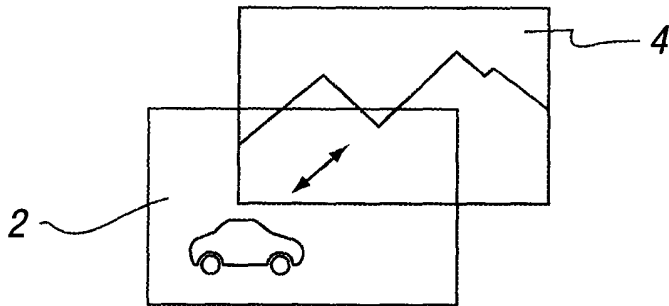
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995



Prepare two images: one for upper layer and one for the lower layer

FIG. 1a



Combine these two images to be displayed in one image

FIG. 1b

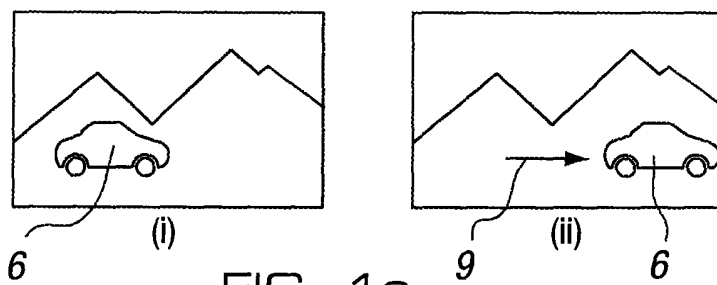
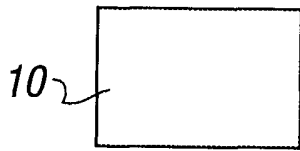
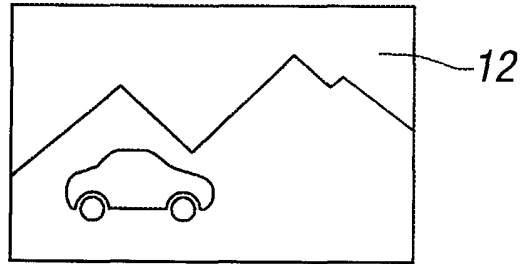


FIG. 1c



Display Window

FIG. 2a



Graphic Data

FIG. 2b

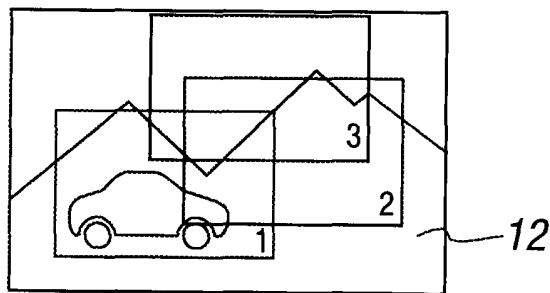
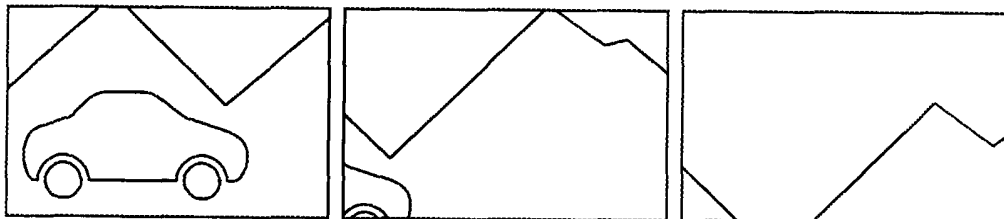


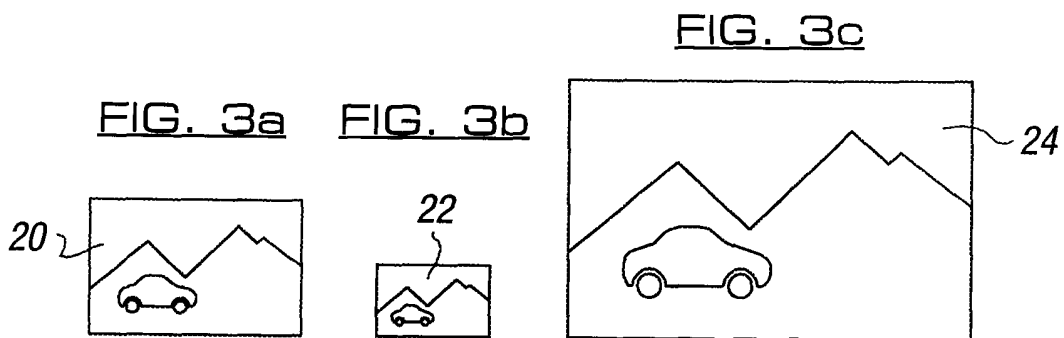
FIG. 2c

FIG. 2d

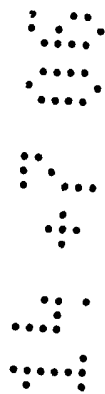
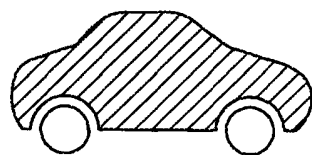
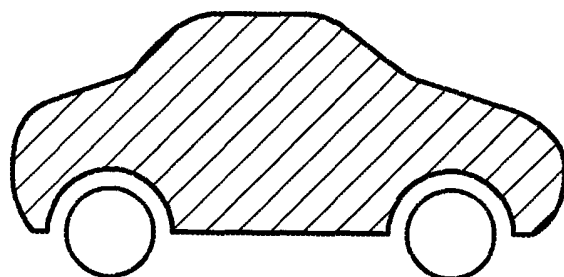
FIG. 2e

FIG. 2f





Use vector data to zoom in and out image and the edge of the image will not change



## Image Display System and Method

The invention to which this application relates is to the provision of a system and method for the generation of an image display on a screen and, particularly, a method and system which allows the generation of changes to the image on a screen in an effective manner. The invention is particularly, but not necessarily exclusively, suited for use on relatively small screen sizes such as for example a screen of the type which would be incorporated into a hand held gaming device, a mobile telephone, a PDA or the like.

The generation of electronic images on screens such as LCD screens by the processing of digital data and the rendering of that data into a viewable image using pixels, is well known. Many known devices such as those indicated above, require screens and for those devices which are required to be portable, there is always a need for the screen size to be kept as small as possible thereby aiding the portability of the device, while, at the same time, ensuring that the image display on the screen is viewable. The image on the screen needs to be viewable and discernable, either for the reasons of allowing operation of the device and/or increasing the enjoyment of using the device.

The need for a screen to be of a relatively small size and yet the image on the same be discernable, represents a trade off between the two requirements and it is found that in many cases, the screen itself may be too small so that the image is not easily discernable or the image may be discernable but the screen is too large for portable devices. This problem is particularly prevalent where the image which is displayed on the screen is required to move, in order for example, a game to be played. On many occasions the movement which does occur is

relatively slow and therefore acts to restrict the enjoyment which can be achieved from the game.

A further problem is in terms of the clarity of the image if, for example, the image is required to move or change relatively quickly and/or the scale of a particular image is required to be changed such that for example a portion of a first display image is required to be enlarged to generate a second display image and so on, or vice versa.

The aim of the present invention is to provide a system and method for the generation of an image on a display screen which allows improvements of the particular image which is to be displayed and furthermore, improvements in the ability to change the image.

In a first aspect of the invention, there is provided a method for the generation of an image on a display screen, said method comprising the steps of generating and processing digital data representing the image, repeating the generating and processing steps so that a plurality of images are available and wherein said images are overlaid or combined into one viewable display image formed from a series of layers, and at least one image layer is subsequently moved or altered to change the viewable image.

In one embodiment, all of the layers of images which lie below the upper layer, are fixed in position such that it is only the upper image layer which is movable with respect to the remaining layers.

By providing the upper layer only to be movable, so a quick changing and continuous movement can be created in terms of the display image on screen. However, as only one image is being moved, the number of updating points or locations for



each new frame or display image is less than would be the case if each of the layers was required to be moved. This allows faster movement or change in the display images or frames while ensuring that movement does still occur.

Typically the viewable image is provided on a frame by frame basis and movement or alteration of any particular frame with respect to the previous frame is provided by alteration or change of one image layer .

In one embodiment said image is of a size which is greater than the display screen on which the said image is to be displayed such that only a portion of said display image is shown on the screen at any given time. In this case the portion of the display image which is shown on the screen, is selected in response to a control signal which selectively positions a portion of the display image on the display screen. Typically the control signal is changed over time to cause the display of different portions of the display image on the display screen in sequence thereby providing an animation effect.

In a further aspect of the invention, there is provided a method for providing a display image which can be changed to provide an animation effect, said method comprising the steps of processing digital data to generate an image, and wherein said image is of a size which is greater than the display screen on which the said image is to be displayed such that only a portion of said display image is shown on the screen at any given time.

Typically, the portion of the display image which is shown on the screen, is selected in response to a control signal which selectively positions a portion of the display image on the display screen.

Typically the method includes the step of changing the control signal over time such that different portions of the display image are shown on the display screen in sequence thereby providing an animation effect.

It will be appreciated that in this embodiment, the display image itself does not change but rather the portion of the display image which is shown on the display screen changes and therefore provides the animation effect.

In a further aspect of the invention, there is provided a method for generating a display image for display on a display screen, said method comprising the steps of processing digital data for the image, converting said data into vector data, using the vector data to magnify and reduce the said image to provide a zooming-in and out function.

Typically, by zooming in and out of the said image display, using the vector data, so objects in the display image can be utilised without the quality of said image being adversely affected by the zooming in or out function.

In a yet further aspect of the invention, there is provided a method for displaying an animated image sequence, said method comprising the selective utilisation of any or any combination of the image display methods as herein described.

In performing this method, so the particular aspect which is utilised in the display of a sequence of images can be done to suit particular image display requirements at that instant and therefore the appropriate method aspects will be utilised at each occasion. The use of this combination of imaging methods will provide an effective and efficient animation sequence.





In one embodiment, the image display which is to be created at any given time, is in response to user selections and/or game control signals and, typically, software will be provided such that when the user control or game signals are received, one or a combination of the known image methods will be selected and the data for the said image display processed accordingly.

Typically the method is of particular use when performed within a hand held game apparatus to cause the generation of an image display linked to a particular game being played at that time. Thus effective displays can be created in relatively low cost apparatus where previously the quality of display which is created would not have been achievable due to cost constraints.

In one embodiment the display screen is an LCD screen, but any suitable display screen could be adapted to be used.

Specific embodiments of the invention are now described with reference to the accompanying drawings, wherein:-

Figures 1a to 1c illustrate a first embodiment of the invention;

Figures 2a to f which illustrate a second embodiment of the invention; and

Figures 3a to c which illustrate a further embodiment of the invention.

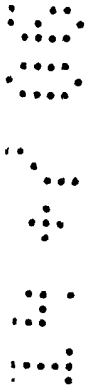
Each of the embodiments or aspects of the invention will now be described in sequence but it should be appreciated that when generating a display image for use a device having a display screen and/or any combination of these imaging methods can be used to form an animation sequence. The particular method used for each image of the sequence, is selected as that which is

most appropriate for the particular animation which is to be created.

Turning now to Figures 1a to c, there is illustrated a first embodiment of the invention. In this case, Figure 1a illustrates first and second image layers 2, 4. The first image layer depicts a motor vehicle 6 and the second image layer displays a mountain range 8. In accordance with the method, the first and second images 2, 4 are overlaid in a layered manner as illustrated in Figure 1b and moved over one another to generate a display image as illustrated in Figure 1c(i). At this stage, the compression ratio of the image information becomes high as the layers are overlaid and thus saves the memory which is used for the plotting of the image.

In accordance with the invention, to generate the animation, it is only the upper or top image 2 which is provided to be moved which, in this case, is the image which shows the motor vehicle 6. Thus, to provide the animation between Figures 1c(i) and Figures 1c(ii) then it is only the top image 2 which is moved with the lower image 4 remaining constant. This therefore provides the effect of the motor vehicle having moved as indicated by arrow 9 illustrated in Figure 1c(ii). Thus a continuous animation display image frame is generated and the number of updating points of each frame can be reduced in comparison with the updating points which would be required if both images were moved. This therefore allows simpler processing to cause the animation and allows a more rapid display change.

In a further arrangement, after the image has been set out layer by layer, it may also be possible to further sub-divide the images portions of each layer and/or it may also be possible, for particular control signals, to decide which of the layers, which



need not be the upper layer, is moved in response to a particular control signal. In this way, further continuous and more complex animated images can be generated.

Turning now to Figures 2a to f, there is illustrated a further aspect of the invention and in this case, the display screen 10 is indicated in Figure 2a and the image display 12 is illustrated in Figure 2b. The image 12 may be formed of a series of layers and may be animated in accordance with the arrangement described with respect to Figures 1a to c and, or alternatively, the animation method of Figures 2a to f can be utilised. It will be seen from a comparison of the size of the display screen 10 and the image display 12, that the display screen is significantly smaller than the image display which is generated. In accordance with the method, the display screen or display window can be moved around the image display so that the image which is actually displayed on the display screen keeps changing. By moving the portion of the image display which is shown on a display screen, then an animated effect is produced. This is illustrated with respect to Figures 2c wherein a sequence of portions 1, 2, 3 are illustrated overlaid on the image display 12. This sequence of portions is then displayed on the display screen to provide an animation sequence as illustrated in Figures 2d to f. This embodiment therefore uses less graphic data for each display and, as the graphic data which is used for each portion is already in the memory, so the animation can be displayed faster and all that is required is that for each portion, the particular location of that portion of the image display, can be used, thereby further increasing the speed of animation as no further processing is required.

Turning now to Figures 3a to e, there is illustrated a further embodiment of the invention, and in this case, there is illustrated a first display 20 which is zoomed in to form a



display 22 as illustrated in Figure 3b and can be zoomed out to provide a larger display 24 as illustrated in Figure 3c. In order to do this, the original data for the image display 20 is converted into a vector format and the zooming in and out of the image is then used to convert it into a lattice image after the creation. As the image is created from vector data, the quality of the created image will not change and no mosaicing will appear. Furthermore, because the image is zoomed in and out by using the vector data, the edges of the image which is shown will not become rough if, for example, the zooming in occurs. Thus, in accordance with this embodiment, the zoomed in image is created before displaying as is the zoomed out image before display and therefore no matter whether the image is zoomed in or out, the edge of the image will remain the same and the quality will not change.

As already stated, it is predicted that an animation sequence can be generated using any or any combination of the methods as herein described and thereby allow an adaptive image display method which is effective and can provide the required visual effects in response to electronic control signals generated, typically via conventional control buttons or other means which are provided to allow the playing of an electronic game which is depicted by the image display which is being generated. Thus, for example, a command signal which is generated by the selective depression of a button by the player which is desired to cause a movement of the image in a particular manner will result in one or a combination of the methods described herein, being used to cause the change in the image display.



## Claims

1 A method for the generation of an image on a display screen, said method comprising the steps of generating and processing digital data representing the image, repeating the generating and processing steps so that a plurality of images are available and wherein said images are overlaid or combined into one viewable display image formed from a series of layers, and at least one image layer is subsequently moved or altered to change the viewable image.

2 A method according to claim 1 wherein all of the layers of images which lie below an upper layer, are fixed in position such that it is only the upper image layer which is movable with respect to change the viewable image.

3 A method according to claim 2 wherein the number of updating points or locations for each new display image is less than would be the case if each of the layers was required to be moved.

4 A method according to claim 1 wherein the viewable image is provided on a frame by frame basis and movement or alteration of any particular frame with respect to the previous frame is provided by alteration or change of one image layer.

5 A method according to claim 1 wherein said image is of a size which is greater than the display screen on which the said image is to be displayed such that only a portion of said display image is shown on the screen at any given time.

6 A method according to claim 5 wherein the portion of the display image which is shown on the screen, is selected in

response to a control signal which selectively positions a portion of the display image on the display screen.

7 A method according to claim 6 wherein the control signal is changed over time to cause the display of different portions of the display image on the display screen in sequence thereby providing an animation effect.

8 A method according to claim 1 wherein said method includes the steps of processing digital data for the image, converting said data into vector data, and using the vector data to magnify or reduce the said image to provide a zooming-in and out function respectively.

9 A method according to any of the preceding claims wherein the image display which is to be created at any given time, is in response to user selections and/or game control signals.

10 A method according to claim 9 wherein when the user control or game signals are received, one or a combination of the image display methods is selected and the data for the said image display processed accordingly.

11 A method for providing a display image with an animation effect, said method comprising the steps of processing digital data to generate an image, and wherein said image is of a size which is greater than the display screen on which the said image is to be displayed such that only a portion of said display image is shown on the screen at any given time.

12 A method according to claim 11 wherein the portion of the display image which is shown on the screen, is selected in response to a control signal which selectively positions a portion of the display image on the display screen.

13 A method according to claim 11 wherein the control signal is changed over time to cause the display of different portions of the display image on the display screen in sequence thereby providing an animation effect.

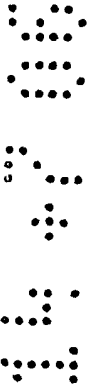
14 A method for generating a display image for display on a display screen, said method comprising the steps of processing digital data for the image, converting said data into vector data, and using the vector data to magnify or reduce the said image to provide a zooming-in and out function respectively.

15 A method for displaying an animated image sequence, said method comprising the selective utilisation of any or any combination of the image display methods of claims 1-14.

16 A method according to claim 15 wherein the particular image method which is utilised in the display of a sequence of images can be done to suit particular image display requirements at that instant in response to user selections and/or game control signals and, typically, software will be provided such that when the user control or game signals are received, one or a combination of the known image methods will be selected and the data for the said image display processed accordingly.

17 A method according to any of the preceding claims wherein the method is performed within a hand held game apparatus to cause the generation of an image display linked to a particular game being played at that time.

18 A method according to any of the preceding claims wherein the display screen is an LCD screen.





For Innovation

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**Application No:** GB0611962.2

**Examiner:** Mr Joe McCann

**Claims searched:** 1-10

**Date of search:** 19 October 2006

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-10	GB 2246933 A (RANK CINTEL) - see abstract
X	1-10	EP 1107605 A (CANON) - see abstract
X	1-10	US 6185342 B1 (ADOBE) - see abstract
X	1-10	EP 0828232 A2 (ADOBE) - see abstract

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

H4T

Worldwide search of patent documents classified in the following areas of the IPC

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC