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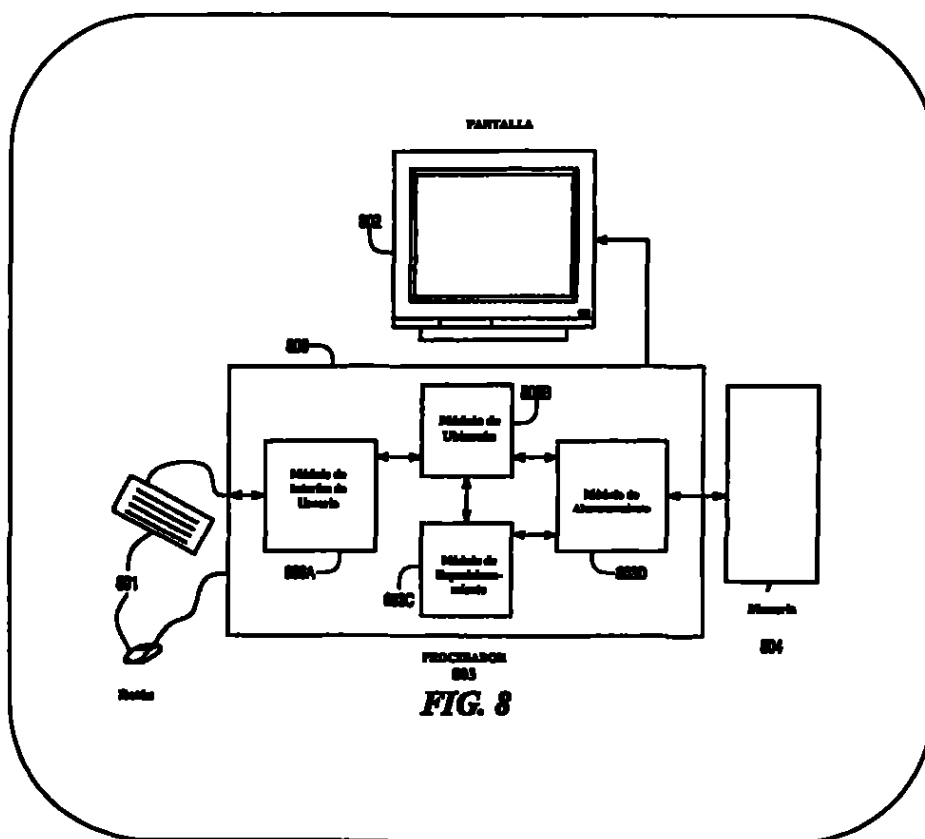
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Anexos

- ☒ Comprobante de pago de la tasa de presentación de la solicitud por \$ 422 000 oo
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica
- ☐ Poderes, si fuere el caso
- ☒ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional (Resumen descripción, reivindicaciones dibujos)
- ☒ Traducción de la solicitud internacional al castellano (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso copia del contrato de acceso
- ☐ De ser el caso documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso certificado de depósito del material biológico
- ☒ Arte final 12x12
- ☐ De ser el caso Información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud
- ☐ Otros

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FIGURA CARACTERISTICA.

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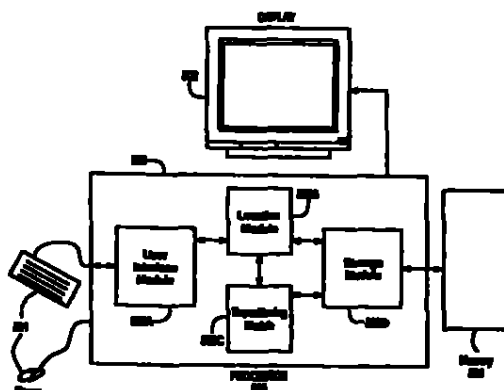
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(54) Title: IMAGE STABILIZATION USING COLOR MATCHING



(57) Abstract: A method for image stabilization of at least two digital images is disclosed. In such an embodiment, a first digital image having a plurality of pixels and at least a second image having a plurality of pixels are provided. Each pixel has an associated address for display and is representative of a color. Either a user of the system provides a color match range or the system provides a predetermined color matched range. A pixel is selected within the first digital image. Preferably the pixel is one that represents an item within the image that is either blurry due to movement of the item or appears jittery due to camera movement. Due to the vast number of available colors a pixel selected in a first image can be matched to a pixel in a second image within a range. The range allows for compensation due to lighting changes. Once the pixel in the first image is selected it can be compared to all pixels within the second image. Each pixel within the second image that is within the color match range is saved and the closest pixel color to the pixel from the first image is selected. The address of the pixels in the second image are then readdressed such that the address of the pixel located in the second image that has the closest color to the pixel in the first image now has the same display address as that of the pixel in the first image. The repositioned second digital image is then stored to memory.

IMAGE STABILIZATION USING COLOR MATCHING

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Technical Field

The present invention relates to analysis of video images and more specifically to image stabilization of video images

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Background

Video stabilization is known within the prior art to minimize image jitter due to camera movement through either mechanical feedback systems or through digital signal processing. The digital signal processing techniques of the prior art are complicated and often are based upon motion estimation and vector analysis. These techniques are designed so as to be minimally intrusive to movement within the image and assess movement of blocks of pixels in order to isolate camera movement jitter

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When objects move within captured video images as opposed to the camera moving details of the moving object being captured often are hard to discern. For example, a license plate of a moving car is often hard to read when the captured video images are displayed due to the great amount of motion from frame to frame of the car. In such a situation, an accounting for the motion of the car would enhance the ability to read the license plate.

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- The traditional image stabilization techniques as discussed above do not provide a way to account for motion such as the motion of a car in order to make a license plate more legible because the techniques are designed to allow such motion to be visible within the sequence of video images while only removing movement due to the movement of the camera.

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Summary of the Invention

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In one embodiment of the invention, a method for image stabilization of at least two digital images is disclosed. In such an embodiment, a first digital image having a plurality of pixels and at least a second image having a plurality of pixels are provided. Each pixel has an associated address for display and is representative of a color. Either a user of the system provides a color match range or the system provides a

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predetermined color matched range. A pixel is selected within the first digital image. Preferably the pixel is one that represents an item within the image that is either blurry due to movement of the item or appears jittery due to camera movement. Due to the vast number of available colors a pixel selected in a first image can be matched to a pixel in a second image within a range. The range allows for compensation due to lighting changes. Once the pixel in the first image is selected it can be compared to all pixels within the second image. Each pixel within the second image that is within the color match range is saved and the closest pixel color to the pixel from the first image is selected. The address of the pixels in the second image are then readdressed such that the address of the pixel located in the second image that has the closest color to the pixel in the first image now has the same display address as that of the pixel in the first image. The repositioned second digital image is then stored to memory.

In other embodiments the image area that is to be searched within the second image may be selected by a user of the method. In another embodiment an alignment point can be selected for aligning the first digital image and the repositioned second digital image such that the pixel of the first frame is aligned with the alignment point and the pixel in the second digital image is aligned with the alignment point when displayed on a display device.

Once the second digital image is saved the first digital image and the repositioned second digital image may be displayed sequentially on a display device wherein the movement of the item will be minimized.

- In a further embodiment, interpolation may be employed to determine color values for comparison in a sequence of video images. In the sequence, a beginning digital image and an ending digital image from the sequence creating a subset sequence are selected. A pixel is selected in the beginning digital image and a pixel is selected in the ending digital image. Linear interpolation is performed between the color of the pixel in the beginning digital image and the color of the pixel in the ending digital image such that an interpolated color is determined for each image between the beginning digital image and the ending digital image. For each interpolated color associated with an image, a pixel is searched for within that image within a predetermined range of colors. Once a pixel is found, each image is repositioned so that the address of the pixel having the interpolated color is positioned to the address of the

pixel selected in the beginning image.

In certain embodiments, the color match range may be equal to zero, such that an exact match needs to be found. The greater the number of representative colors, such as true color or 16.7 million colors, the greater the likelihood that a match of one pixel in a first frame represents the same physical location as that of a pixel in a second frame having the same or a very similar color. If a color is not found in an image that is within a color match range, the method can default to a standardized formula for repositioning the image based upon historic information.

The method may also be implemented in a computer system and embodied on a computer program product for use with the computer system in which the method is embodied in computer readable code. Further, the method may be embodied in a system which includes a user interface, a processor, and associated memory. The processor includes a user interface module for receiving signals from the user interface. In such a configuration, a user may send signals to the processor through the user interface indicating the video sequence to be processed, indicating a color match range, selecting pixel values, selecting alignment positions, for example. The processor also includes a location module for locating a pixel within a second frame having an associated color that is within a color range of a color associated with the pixel selection from the first video frame. The processor further includes a repositioning module for readdressing the second video frame so that the located pixel of the second frame has an address that is the same address as the pixel selection from the first video frame and also includes a storage module for storing the readdressed second video frame.

Brief Description of the Drawings

The features of the invention will be more readily understood by reference to the following detailed description, taken with reference to the accompanying drawings, in which

Fig. 1 is an image having a resolution of 800x600 pixels,

Fig. 2 is a flow chart showing one method for image stabilization through color matching performed in conjunction with a computer system,

Figs 3A-C show pixels being repositioned on a screen,

Fig. 3A shows a first frame with a selected pixel,

Fig. 3B shows a second frame with a pixel marked having a color within a color tolerance of the pixel selected in Fig. 3A,

Fig. 3C shows the second frame of Fig. 3B superimposed and realigned on the first frame of Fig. 3A,

Fig. 4 is a flow chart showing another embodiment for image stabilization,

Fig. 5 is a flow chart showing another embodiment of image stabilization using color matching and interpolation,

Fig. 6 shows pixel selection in a beginning and ending frame of a video sequence,

Fig. 7A shows a video sequence prior to image stabilization in which all of the images are aligned,

Fig. 7B shows the video sequence of Fig. 7A after realignment; and

Fig. 8 shows one embodiment of the invention as a system.

Detailed Description of Specific Embodiments

As used in the following text, the term "video sequence" implies a digital representation of a sequence of images which may be temporally displayed on a display device. Typically, a video sequence contains a plurality of frames wherein each frame represents a separate image. The frames may be further subdivided such that the frames are made up of a series of pixels. As used in the following description the term "pixel" shall mean a single point of an image. The greater the number of pixels that are contained in an image, the greater the resolution of the video. Resolution of an image/frame is conventionally referenced by length and width measurements of the number of pixels, for example, in a resolution of 800x600, there are 800 pixels along the length of an image by 600 pixels along the width of the image. Associated with each pixel is an address. For example as shown in Fig. 1 an image having a resolution of 800x600 is presented and pixel at address (200,300) is marked with an X wherein the origin is located at the upper left hand corner of the screen. As used herein a frame may be either a complete image or a portion of an image, such as a field which includes only one half of a complete image.

In an embodiment of the invention, a method is presented for stabilizing video images of a digital video sequence wherein the digital video sequence includes a

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plurality of digital images/frames. Stabilization is performed through color matching of a selected pixel color in a first frame by searching for a pixel in a second frame that has a color which falls within a color tolerance. The second frame is then aligned with the first frame such that the pixel in the second frame with the matching color has the same pixel address as that of the selected pixel from the first frame. The second frame is then stored to memory. This methodology is especially useful as the resolution and number of possible colors which can be represented increases. As video moves to HDTV formats which have 16.7 million and greater possible colors for a pixel color value, pixel color values become more unique and thus color tracking is more effective means for matching images and providing stabilization of images and accounting for motion within images.

The method for image stabilization through color matching is performed in conjunction with a computer system wherein the computer system includes at least a display, an input device, associated memory and a processor. The method is explained in more formal detail with reference to Fig. 2. First a digital sequence is retrieved by the processor of the computer system from a memory location 200. A color tolerance is either predetermined and accessed by the processor or the user is queried for entry of a color tolerance 210. The color tolerance is the range within which a color match will be deemed to occur. A first frame of the video sequence is then displayed to a user. The user then selects a pixel within the first frame 220. Preferably the pixel is of a distinct color or the pixel is part of an object which moves within the video sequence and appears jittery when the video sequence is displayed. After the pixel is selected, the processor identifies the color associated with the pixel 230. The processor then retrieves the second frame and performs a search of the second frame to identify a pixel that has the same color as that of the selected pixel from the first frame within the color tolerance 240. Color matching may be performed by taking the overall color for a pixel including all color components or weighting the individual color components. For example, if the video sequence is represented in an R,G,B, color space, an identical color match (i.e. one having a color tolerance of 0%) might require that each of the R,G, and B values are identical. The color tolerance may be the overall difference in color as a percentage. For example, a color tolerance may be 0.05% wherein the color space includes 16.7 million colors or a color tolerance may require that each color component

must be within a certain tolerance of say 10% of each R,G, and B value of the selected pixel. Once a pixel within the second frame is identified, the pixel address from the second frame is then aligned with the pixel address of the selected pixel of the first frame. Figs 3A, B and C show the pixels being repositioned. Fig. 3A shows a first frame with a selected pixel marked with an X as would be displayed in the display device. Fig. 3B is a second frame wherein a pixel that matches the selected pixel from the first frame is identified with an O. Fig. 3C shows that the displayed pixels of the second frame is repositioned, and thus readdressed. After the second frame is repositioned and thus the addresses of all of the pixels of the frame are changed, the realigned second frame is stored to memory by the processor 260. This process can be continued for each frame of a video sequence. In such an embodiment, the color of the selected pixel from the first frame would be searched for in each subsequent frame. It should be noted that some pixel values of the realigned second frame will not be shown on the display device because the new addresses of these pixels falls outside of the display addresses. Further, some display addresses for the second realigned frame will not have color values for the pixels. In one embodiment, these pixel addresses are made black. In other embodiments, default color values can be assigned such as the color values from adjacent pixel addresses.

The methodology may be further defined as shown in Fig. 4. As expressed above, a video sequence is received by a processor from a memory location. A first frame is presented to a user. The user defines a search area within a video frame step 401. For example, the user may use an input device such as a mouse or a light pen to graphically indicate the search area. In one embodiment, the entire video frame is the default search area. Defining a search area that is less than the entire image may be beneficial in images in which a user is interested in a particular element of an image. For example, if the video sequence is of a car that is driving away and the user is interested in the license plate of the car, the user may select a sub-section of the video frame. In the example, the user would indicate that the license plate or a portion of the car was the selected sub-set of the image. The image displayed after re-alignment of the frames could be the entire video frame or just the selected sub-set of the frame.

In a video sequence in which the moving object that is desired to be made still moves across the entire frame, selection of a sub-section of the image, such as that of a

license plate, should be done over a short sequence of frames. For example, if the entire sequence is of 120 fields of video (approx. 2sec.), the sequence may be subdivided such that only a few frames (for example 10 fields) are used. The car and the license plate can then be designated as the sub-section of the image for comparison purposes since the license plate of the car will not move many pixel locations over 10 fields. By selecting a sub-section, this improves the odds that the color matched pixels actually represent the same physical point.

The user is also prompted by the computer system for a color tolerance which as explained above is the acceptable margin of error for matching a color 402. The user can also indicate an alignment point which is the point on the output screen of the display device at which to align the pixel whose color best matches the tracking color 403. In one embodiment, the default is the center of the screen of the display device although other positions on the display may also be selected. The user also provides the color to be tracked 404. This is done by observing the first video frame and selecting a pixel using the user input device.

For each video frame 420, the color values for each pixel of the search area are compared 430 with the color values of the selected tracking color from the first video frame. If the color values for the color space (e.g. R,G,B) of a pixel are within the entered tolerance 440, the pixel will be considered a match. The pixel in which the sum of the absolute values of the differences between the red, green and blue color values to those of the tracking color is smallest is identified as the color match point. If the color match point is within the entered tolerance for each of the color space values associated with the selected pixel, the frame is shifted 450 so that the pixel identified as the best color match is placed at the alignment point on the screen and the shifted frame is then written out to memory. If no color match is found, the image is shifted 460 according to a predetermined formula. For instance, the shifts may be determined by analyzing past shifts and averaging the shifts to determine how to align the frame of video data. For example, the image may be shifted in the x direction by a weighted average of previously shifted distances in the x-direction. Similarly, the shift in the y direction may be a weighted average of previously shifted distances in the y-direction.

In other embodiments, the image may be shifted according to the following formulae

$x_{diff} = ((sx1 - sx2) + (sx2 - sx3) + (sx3 - sx4))/3 * (sd)$, and

$y_{diff} = ((sy1 - sy2) + (sy2 - sy3) + (sy3 - sy4))/3 * (sd)$, where

$sx1$ = previous horizontal shift; $sy1$ = previous vertical shift;

$sx2$ = horizontal shift before $sx1$, $sy2$ = vertical shift before $sy1$,

$sx3$ = horizontal shift before $sx2$, $sy3$ = vertical shift before $sy2$;

$sx4$ = horizontal shift before $sx3$, $sy4$ = vertical shift before $sy3$, and

where sd is a slowdown factor

The frame is then shifted 460 by an amount given by the following equations

horizontal shift = $sx1 + x_{diff}$, and

vertical shift = $sy1 + y_{diff}$

The shifted frame is then written out 465 to the video image store.

If the input stream contains 470 more video frames, the next frame is processed

420 Once all of the frames in the input stream are processed, the color tracking operation is complete

15 Once all of the frames of video are repositioned using the color tracking, the sequence of frames may be temporally displayed on a display device and thus movement of the camera or object will be reduced. Other than display of the video frames in a temporal fashion, the video frames may be linearly averaged in order to provide a higher definition image or portion of an image. For example, a license plate on a vehicle that is moving and which is unreadable due to jitter may be readable once the image is stabilized. Even if it is not, all of the frames may be linearly averaged together to produce a higher resolution image that may provide an enhanced image wherein the license plate is legible. By precisely aligning the images to a sub-pixel resolution, and averaging the images together, a higher resolution image can be generated. This is due to the fact that as several images of an object are captured, each image presents a slightly different part of the object in each frame. In general a minimum of three to five frames are needed to improve the image.

25 In another embodiment of the invention, interpolation is employed in conjunction with color matching as is explained in Fig. 5. In such an embodiment, a video sequence is provided into a computer system 500. A user of the system is allowed to view the video sequence on a display device and select a beginning frame and an ending frame 501. A pixel is selected in both the beginning frame and the ending frame

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502. Preferably the pixel in the beginning frame and the ending frame is a pixel is part of an object for which motion stabilization is desired. For instance, a pixel may be selected from a video image of a car that is moving. A pixel in the ending frame should be selected that is part of the car as shown in Fig. 6. The system then interpolates between the color value for the selected pixel in the beginning frame and the color value of the pixel in the ending frame 503. The interpolation method may be any interpolation method known by one of ordinary skill in the art, such as linear, bi-linear, and bi-cubic interpolation. The interpolation method provides interpolation values for each frame between the beginning frame and the ending frame. For example, if there are four frames, an interpolated color value would be determined for the second and third frames. Once a color value is determined for each frame between the beginning and ending frames, the processor begins to search for that color value in each respective frame 504. The processor may use a color match range/color tolerance to locate a pixel that matches the color. In one embodiment the processor searches for the first pixel that has the exact color and does not use a color tolerance. In another embodiment, each pixel that is within the color tolerance is saved to memory and a difference measurement as described above is determined until the pixel with the closest color match is determined 505. If no pixels match, the processor employs a formula such as that provided above, or another formula that is based upon trend analysis or another property of the video sequence 506. When a pixel has been selected for each frame, the frames after the beginning frame including the ending frame are re-aligned 507. Realignment requires that the associated addresses of each pixel are re-determined, such that when the video sequence is displayed on a display device the pixel location of the pixel selected in the first frame corresponds with the pixels in the subsequent frames that match the color value. For example, as shown in Fig. 7A, a pixel is selected in the beginning frame wherein the remaining frames are aligned as they would normally be displayed. Fig. 7B shows the video frames realigned such that the color matched pixels from all frames subsequent to the beginning frame are positioned at the same point on a display screen as the selected pixel from the beginning frame. This process can be repeated if less than the entire video sequence is included between the beginning frame and the ending frame.

The method for image stabilization may be embodied as a system as shown in

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Fig. 8 The system 800 includes an input device 801 such as a mouse, trackball, keyboard, etc and video display 802 and a processor 803 having associated memory 804. The processor includes various modules. The first module is a user interface module 803A that operates to receive signals from the user input device. The user can input a request to perform image stabilization on a selected video image sequence. The user can view the first frame of the video sequence and select a pixel within the sequence wherein the user interface module 803A receive this information and sends the information to a location module 803B that identifies the color of the selected pixel and accesses a second frame of the video data. The location module 803B searches the data values of the second frame in order to identify the pixel that is the closest color match to the pixel selected in the first frame. If no pixel is found that is within the color range, then the location module 803B defaults to a predetermined formula such as that which was described above. When a pixel has been identified, the location of the pixel is presented to a repositioning module 803C that re-addresses all of the pixels within the second frame such that the located pixel in the second frame has a new address that is the same display address as the pixel selected in the first frame. The address information along with the corresponding pixel color values are stored to memory by a storage module 803D.

It should be noted that the flow diagrams are used herein to demonstrate various aspects of the invention, and should not be construed to limit the present invention to any particular logic flow or logic implementation. The described logic may be partitioned into different logic blocks (e.g., programs, modules, functions, or subroutines) without changing the overall results or otherwise departing from the true scope of the invention. Oftentimes, logic elements may be added, modified, omitted, performed in a different order, or implemented using different logic constructs (e.g., logic gates, looping primitives, conditional logic, and other logic constructs) without changing the overall results or otherwise departing from the true scope of the invention.

The present invention may be embodied in many different forms, including, but in no way limited to, computer program logic for use with a processor (e.g., a microprocessor, microcontroller, digital signal processor, or general purpose computer), programmable logic for use with a programmable logic device (e.g., a Field Programmable Gate Array (FPGA) or other PLD), discrete components, integrated

circuitry (e.g., an Application Specific Integrated Circuit (ASIC)), or any other means including any combination thereof

Computer program logic implementing all or part of the functionality previously described herein may be embodied in various forms, including, but in no way limited to, a source code form, a computer executable form, and various intermediate forms (e.g., forms generated by an assembler, compiler, linker, or locator). Source code may include a series of computer program instructions implemented in any of various programming languages (e.g., an object code, an assembly language, or a high-level language such as Fortran, C, C++, JAVA, or HTML) for use with various operating systems or operating environments. The source code may define and use various data structures and communication messages. The source code may be in a computer executable form (e.g., via an interpreter), or the source code may be converted (e.g., via a translator, assembler, or compiler) into a computer executable form.

The computer program may be fixed in any form (e.g., source code form, computer executable form, or an intermediate form) either permanently or transitorily in a tangible storage medium, such as a semiconductor memory device (e.g., a RAM, ROM, PROM, EPROM, or Flash-Programmable RAM), a magnetic memory device (e.g., a diskette or fixed disk), an optical memory device (e.g., a CD-ROM), a PC card (e.g., PCMCIA card), or other memory device. The computer program may be fixed in any form in a signal that is transmittable to a computer using any of various communication technologies, including, but in no way limited to, analog technologies, digital technologies, optical technologies, wireless technologies, networking technologies, and internetworking technologies. The computer program may be distributed in any form as a removable storage medium with accompanying printed or electronic documentation (e.g., shrink wrapped software or a magnetic tape), preloaded with a computer system (e.g., on system ROM or fixed disk), or distributed from a server or electronic bulletin board over the communication system (e.g., the Internet or World Wide Web).

Hardware logic (including programmable logic for use with a programmable logic device) implementing all or part of the functionality previously described herein may be designed using traditional manual methods, or may be designed, captured, simulated, or documented electronically using various tools, such as Computer Aided

Design (CAD), a hardware description language (e.g., VHDL or AHDL), or a PLD programming language (e.g., PALASM, ABEL, or CUPL.)

The present invention may be embodied in other specific forms without departing from the true scope of the invention. The described embodiments are to be considered in all respects only as illustrative and not restrictive.

01247/00A65 216709 1


We claim

1 A method for image stabilization of a first digital image having a plurality of pixels and at least a second image having a plurality of pixels wherein each pixel has an associated address for display and is representative of a color, the method comprising:

5 providing a color match range,
 selecting a pixel within the first digital image,
 identifying the color associated with the selected pixel in the first digital image,
10 locating a pixel in the second image that is within the color match range of the color associated with the pixel from the first digital image,

 repositioning the second image, so that the address of the pixel in the second digital image is positioned at the address of the selected pixel in the first digital image, and

15 storing the repositioned second digital image to memory

2 The method according to claim 1 further comprising:
selecting an image area to be used for locating a pixel in the second image.

20 3 The method according to claim 1, further comprising:
providing an alignment point for aligning the first digital image and the repositioned second digital image such that the pixel of the first frame is aligned with the alignment point and the pixel in the second digital image is aligned with the alignment point when displayed on a display device.

25 4 The method according to claim 1, further comprising displaying the first and the repositioned second digital image sequentially on a display device.

30 5 A method for image stabilization of a digital sequence of images, wherein each image has a plurality of pixels and wherein each pixel has an associated address for display and is representative of a color, the method comprising:
selecting a beginning digital image and an ending digital image from the sequence

creating a subset sequence,

selecting a pixel in the beginning digital image and a pixel in the ending digital image,

linearly interpolating between the color of the pixel in the beginning digital image and the color of the pixel in the ending digital image such that an interpolated color is determined for each image between the beginning digital image and the ending digital image,

for each interpolated color associated with an image, searching, within that image, for a pixel having the interpolated color within a predetermined range of colors,

repositioning each image between the beginning digital image and the ending digital image, so that the address of the pixel having the interpolated color within an image is positioned to the address of the pixel selected in the beginning image.

6 The method according to claim 5 further comprising displaying at least the subset sequence on a display

7 The method according to claim 5 further comprising:
selecting an image area to be used for locating a pixel in the second image.

8 The method according to claim 5, further comprising
providing an alignment point for aligning the first digital image and the repositioned second digital image such that the pixel of the first frame is aligned with the alignment point and the pixel in the second digital image is aligned with the alignment point when displayed on a display device.

9 The method according to claim 5, wherein the subset sequence includes all of the images within the sequence.

10 The method according to claim 1, wherein the color match range requires an identical color match.

11 The method according to claim 5, wherein the predetermined range requires an identical color match

12 The method according to claim 1 wherein a color space having millions
5 of colors is used to represent the pixel colors.

13 The method according to claim 5 wherein the pixel colors are represented in a color space having millions of colors

10 14 The method according to claim 1, wherein if a pixel is not located within the color match range, applying a predetermined formula for repositioning the pixels of the second frame.

15 15 The method according to claim 5, wherein if a pixel is not located within the color match range, applying a predetermined formula for repositioning the pixels of the second frame.

16 The method according to claim 1, further comprising:
receiving a signal containing information representative of a color match range.

20 17 The method according to claim 5, further comprising
receiving a signal containing information representative of a color match range.

25 18 A method for image stabilization of a sequence of temporally displayed digital video images, wherein each image contains a number of pixels and each pixel has an associated display position, the method comprising:

receiving a signal containing information representative of a color associated with a pixel contained within a first image of the sequence of digital video images,

30 identifying a pixel within a second image having a color value within a threshold range from the color contained within the first image, wherein the threshold may be any value including zero, and

20

repositioning the second image such that the pixel within the second image having a color value within the threshold range resides at the same position as the pixel from the first image when temporally displayed.

5 19 The method according to claim 18, further comprising receiving a signal containing information representative of a color match range.

10 20 A method for image stabilization of a sequence of temporally displayed digital video images, wherein each image contains a number of pixels and each pixel has an associated display position, the method comprising:

receiving a signal containing information representative of a color associated with a pixel contained within a first image of the sequence of digital video images, receiving a signal representative of a color contained in a third digital image, interpolating between the color in the first digital video image and the color in the third digital video image to determine a searchable color in a second digital video image,

15 identifying a pixel within the second digital video image having a color distance within a threshold range from the searchable color, wherein the threshold may be any value including zero, and

20 repositioning the second image such that the pixel within the second image having a color distance within the threshold range resides at the same position as the pixel from the first image when displayed on a display device.

25 21 A system for image stabilization of a video sequence having a plurality of video frames, the system comprising:

a user interface, and

a processor;

wherein the processor includes a user interface module for receiving signals from the user interface,

30 wherein the signals include a signal representative of a pixel selection in a first video frame,

the processor also includes a location module for locating a pixel within a second frame having an associated color that is within a color range of a color associated with the pixel selection from the first video frame,

a repositioning module for readdressing the second video frame so that the located pixel of the second frame has an address that is the same address as the pixel selection from the first video frame, and

a storage module for storing the readdressed second video frame.

22 The system according to claim 21, further comprising memory

23 A computer program product having a computer program thereon containing computer code for image stabilization of a first digital image having a plurality of pixels and at least a second image having a plurality of pixels wherein each pixel has an associated address for display and is representative of a color, the computer code comprising

computer code for providing a color match range,

computer code for selecting a pixel within the first digital image,

computer code for identifying the color associated with the selected pixel in the first digital image,

computer code for locating a pixel in the second image that is within the color match range of the color associated with the pixel from the first digital image,

computer code for repositioning the second image, so that the address of the pixel in the second digital image is positioned at the address of the selected pixel in the first digital image, and

computer code for storing the repositioned second digital image to memory

24 The computer program product according to claim 23 further comprising

computer code for allowing user selection of an image area to be used for locating a pixel in the second image

25 The computer program product according to claim 23, further comprising

5 computer code for allowing a user to provide an alignment point for aligning the first digital image and the repositioned second digital image such that the pixel of the first frame is aligned with the alignment point and the pixel in the second digital image is aligned with the alignment point when displayed on a display device.

10 26 The computer program product according to claim 23, further comprising: computer code for displaying the first and the repositioned second digital image sequentially on a display device.

15 27 A computer program product for use with a computer having computer readable code thereon for image stabilization of a digital sequence of images, wherein each image has a plurality of pixels and wherein each pixel has an associated address for display and is representative of a color, the computer readable code comprising

 computer code for allowing user selection of a beginning digital image and an ending digital image from the sequence creating a subset sequence,

 computer code for allowing user selection of a pixel in the beginning digital image and a pixel in the ending digital image,

20 computer code for interpolating between the color of the pixel in the beginning digital image and the color of the pixel in the ending digital image such that an interpolated color is determined for each image between the beginning digital image and the ending digital image,

25 computer code for searching, within that image, for a pixel having the interpolated color within a predetermined range of colors for each interpolated color associated with an image,

30 computer code for repositioning each image between the beginning digital image and the ending digital image, so that the address of the pixel having the interpolated color within an image is positioned to the address of the pixel selected in the beginning image.

28 The computer program product according to claim 27 further comprising: computer code for displaying at least the subset sequence on a display

5 29 The computer program product according to claim 27 further comprising:

computer code for allowing a user to select an image area to be used for locating a pixel in the second image.

10 30 The computer program product according to claim 27, further comprising.

computer code for allowing user selection of an alignment point for aligning the first digital image and the repositioned second digital image such that the pixel of the first frame is aligned with the alignment point and the pixel in the second digital image is aligned with the alignment point when displayed on a display device.

15 31 The computer program product according to claim 27, wherein the subset sequence includes all of the images within the sequence.

20 32 The computer program product according to claim 27, wherein the color match range requires an identical color match

33 The method according to claim 23, wherein the predetermined range requires an identical color match.

25 34 The computer program product according to claim 27 wherein a color space having millions of colors is used to represent the pixel colors.

35 The computer program product according to claim 23 wherein the pixel colors are represented in a color space having millions of colors.

30 36 The computer program product according to claim 27, further comprising computer code for applying a predetermined formula for repositioning the

pixels of the second frame if a pixel is not located within the color match range.

5 37 The computer program product according to claim 23, further comprising computer code for applying a predetermined formula for repositioning the pixels of the second frame if a pixel is not located within the color match range.

 38 The computer program product according to claim 23, further comprising
10 computer code for receiving a signal containing information representative of a color match range.

 39 The computer program product according to claim 27, further comprising
15 computer code for receiving a signal containing information representative of a color match range

 40 A computer program product for use with a computer wherein the computer program product has computer readable code thereon for image stabilization of a sequence of temporally displayed digital video images, wherein each image
20 contains a number of pixels and each pixel has an associated display position, the computer code comprising

 - computer code for receiving a signal containing information representative of a color associated with a pixel contained within a first image of the sequence of digital video images,

25 computer code for identifying a pixel within a second image having a color value within a threshold range from the color contained within the first image, wherein the threshold may be any value including zero, and

 computer code for repositioning the second image such that the pixel within the second image having a color value within the threshold range resides at the same
30 position as the pixel from the first image.

25

41 The computer program product according to claim 40, further comprising:

computer code for receiving a signal containing information representative of a color match range.

5

42. A computer program product for use with a computer, the computer program product having computer readable code thereon for image stabilization of a sequence of temporally displayed digital video images, wherein each image contains a number of pixels and each pixel has an associated display position, the computer code comprising

10

computer code for receiving a signal containing information representative of a color associated with a pixel contained within a first image of the sequence of digital video images,

computer code for receiving a signal representative of a color contained in a third digital image,

15

computer code for interpolating between the color in the first digital video image and the color in the third digital video image to determine a searchable color in a second digital video image,

computer code for identifying a pixel within the second digital video image having a color distance within a threshold range from the searchable color, wherein the threshold may be any value including zero, and

20

computer code for repositioning the second image such that the pixel within the second image having a color value within the threshold range resides at the same position as the pixel from the first image when displayed on a display device

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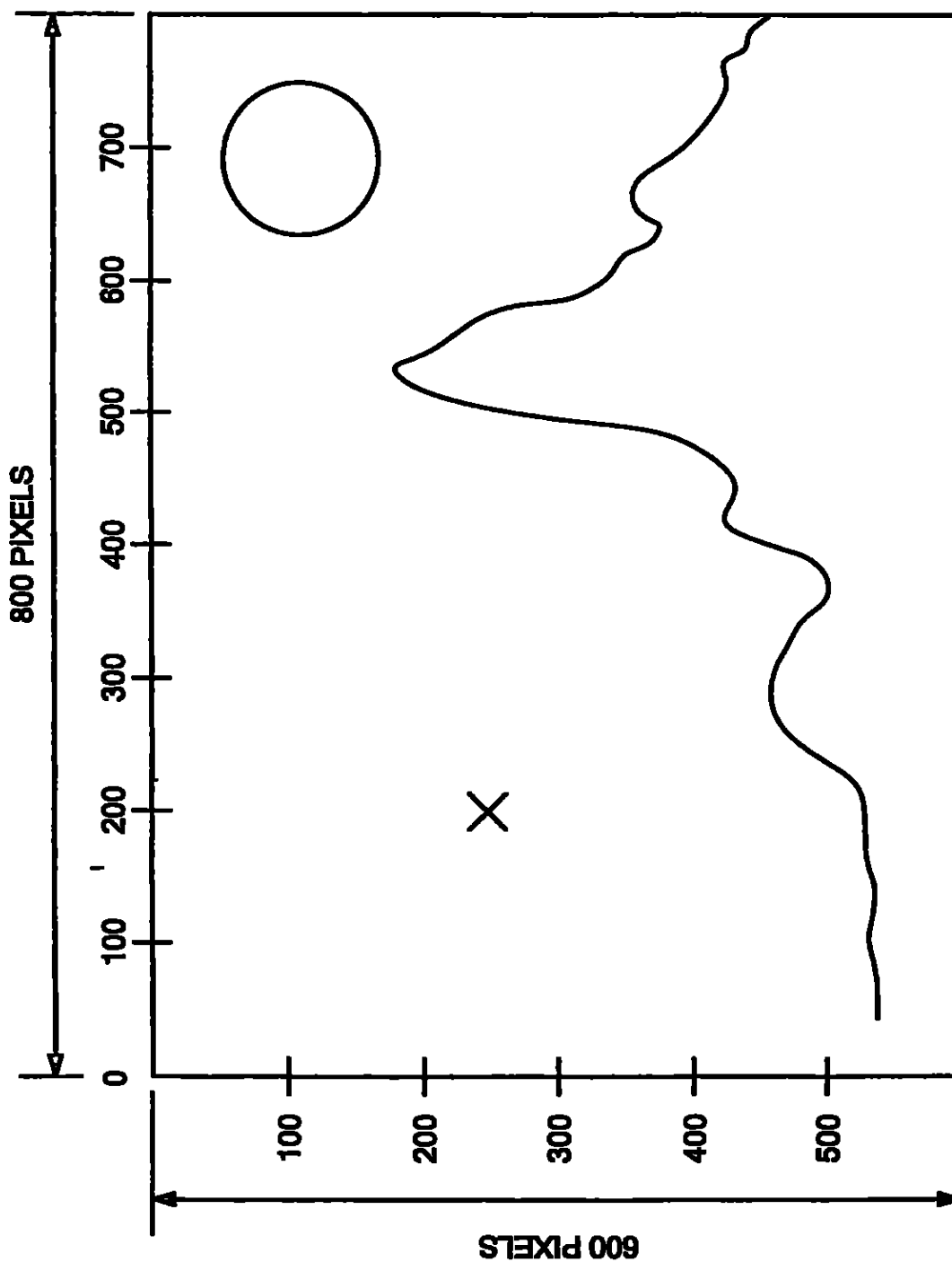
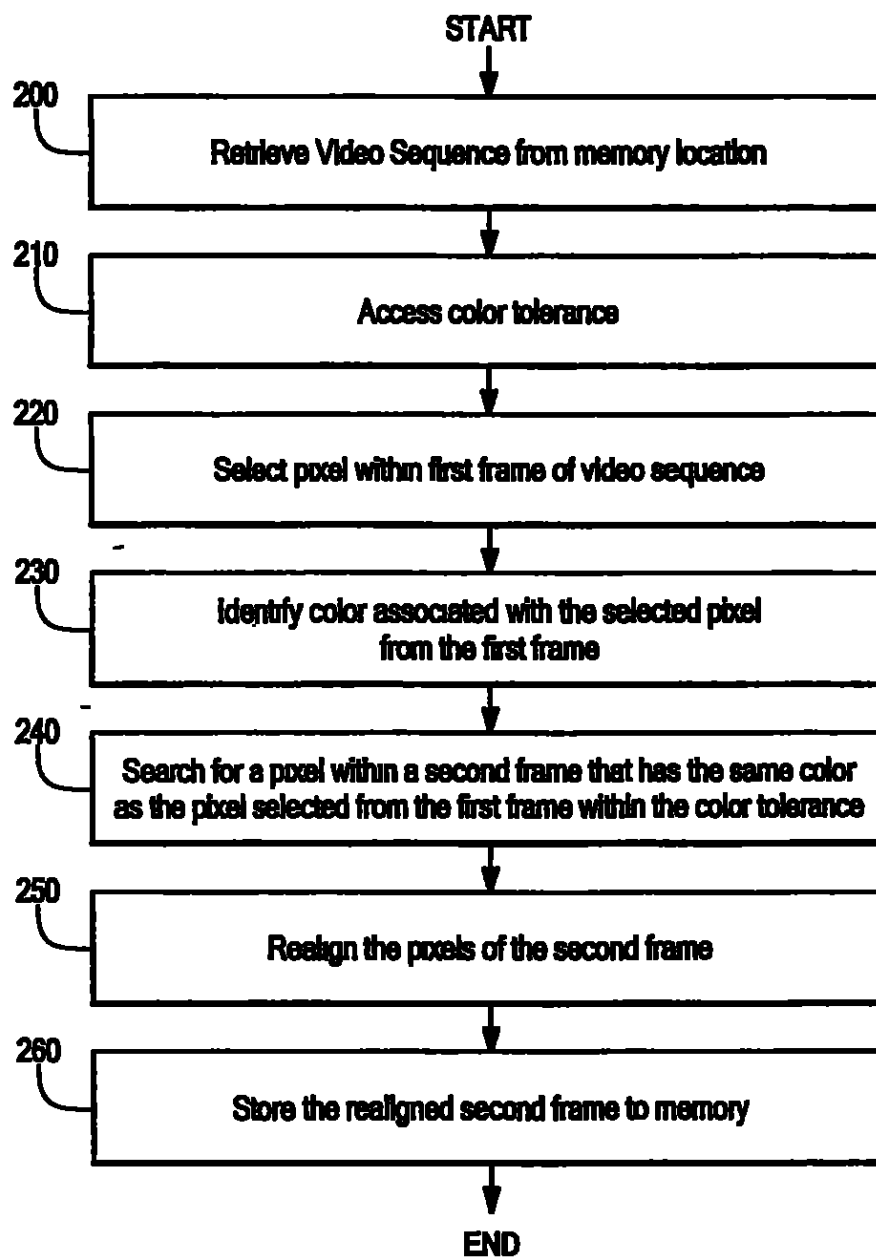


FIG. 1

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**FIG. 2**

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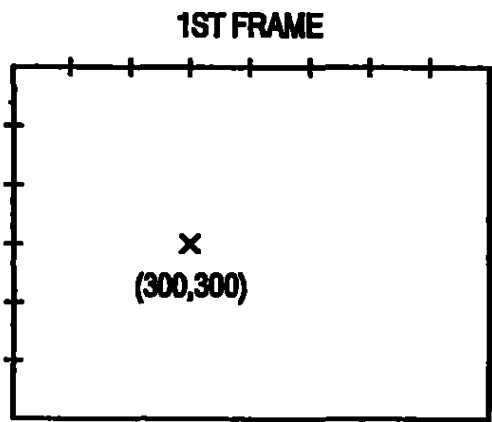


FIG. 3A

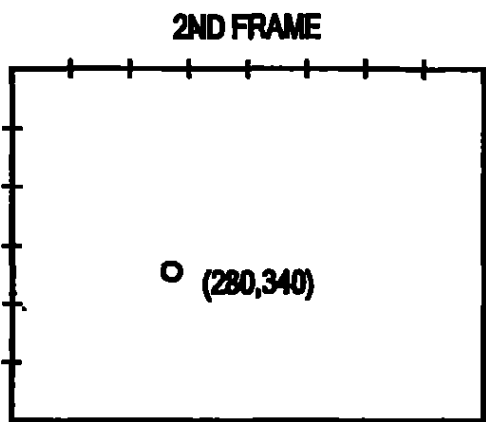


FIG. 3B

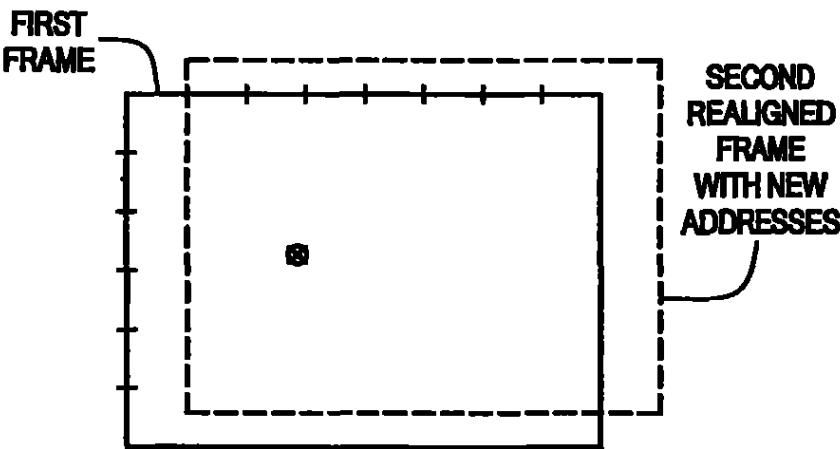
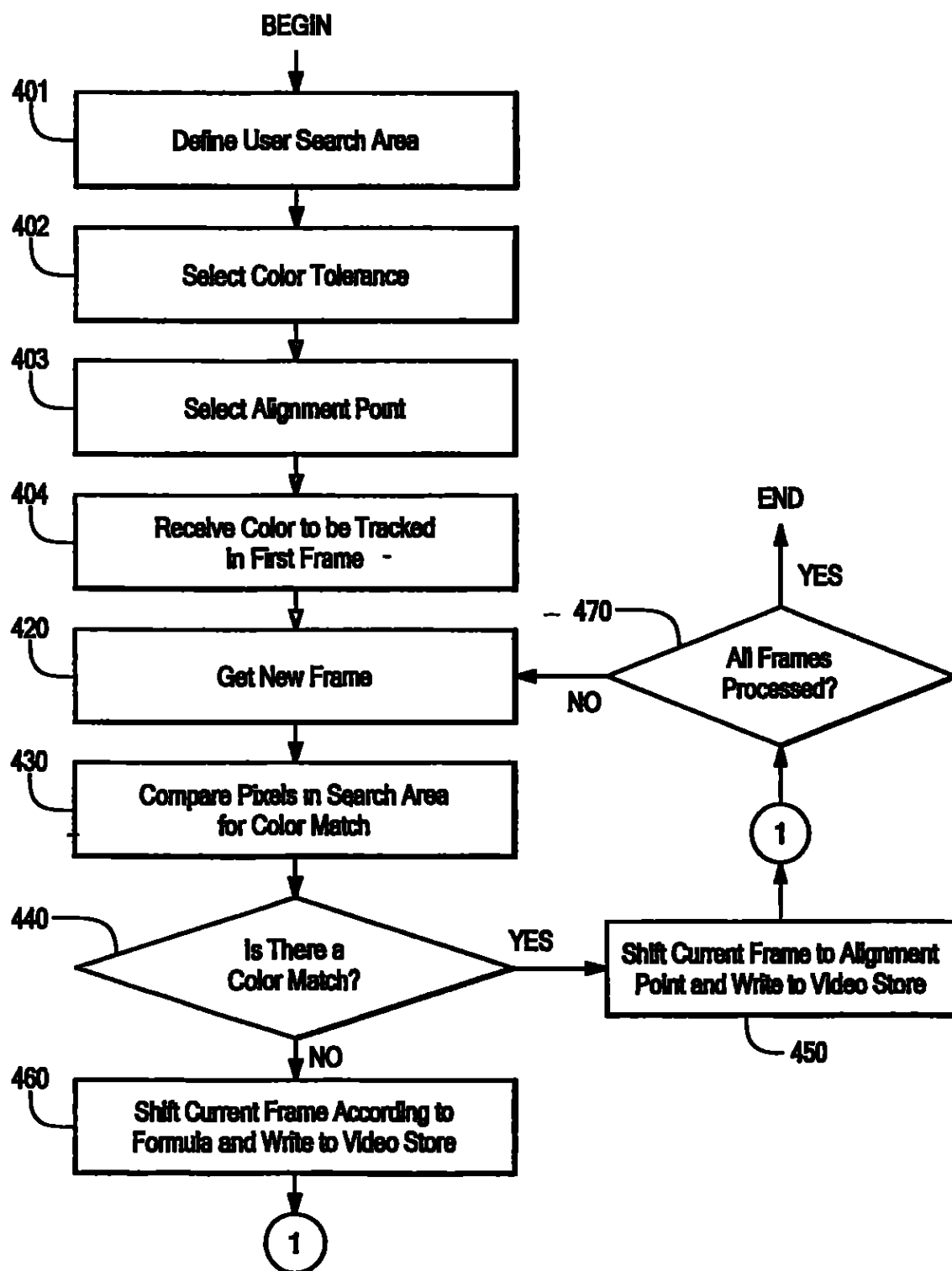


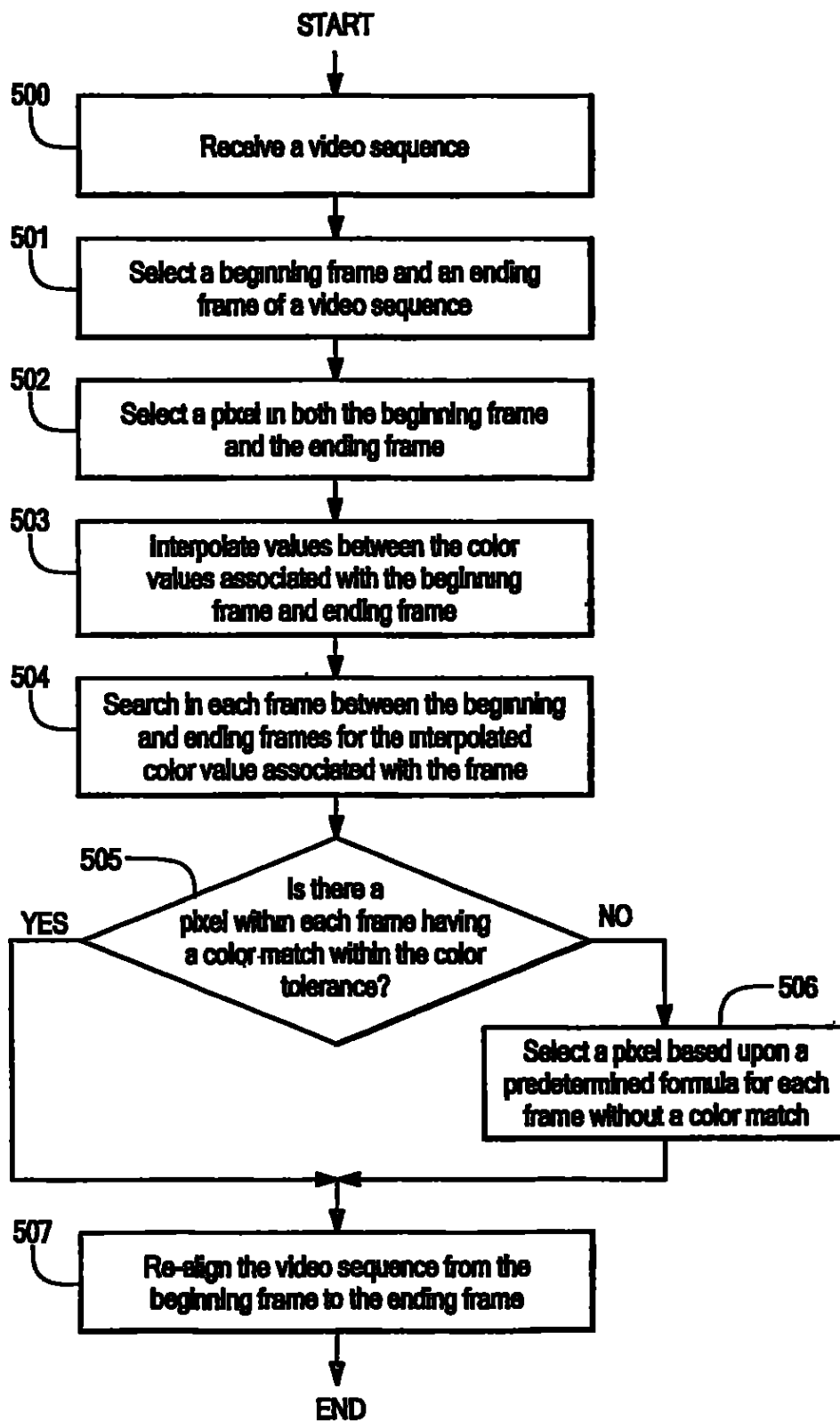
FIG. 3C

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**FIG. 4**

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**FIG. 5**

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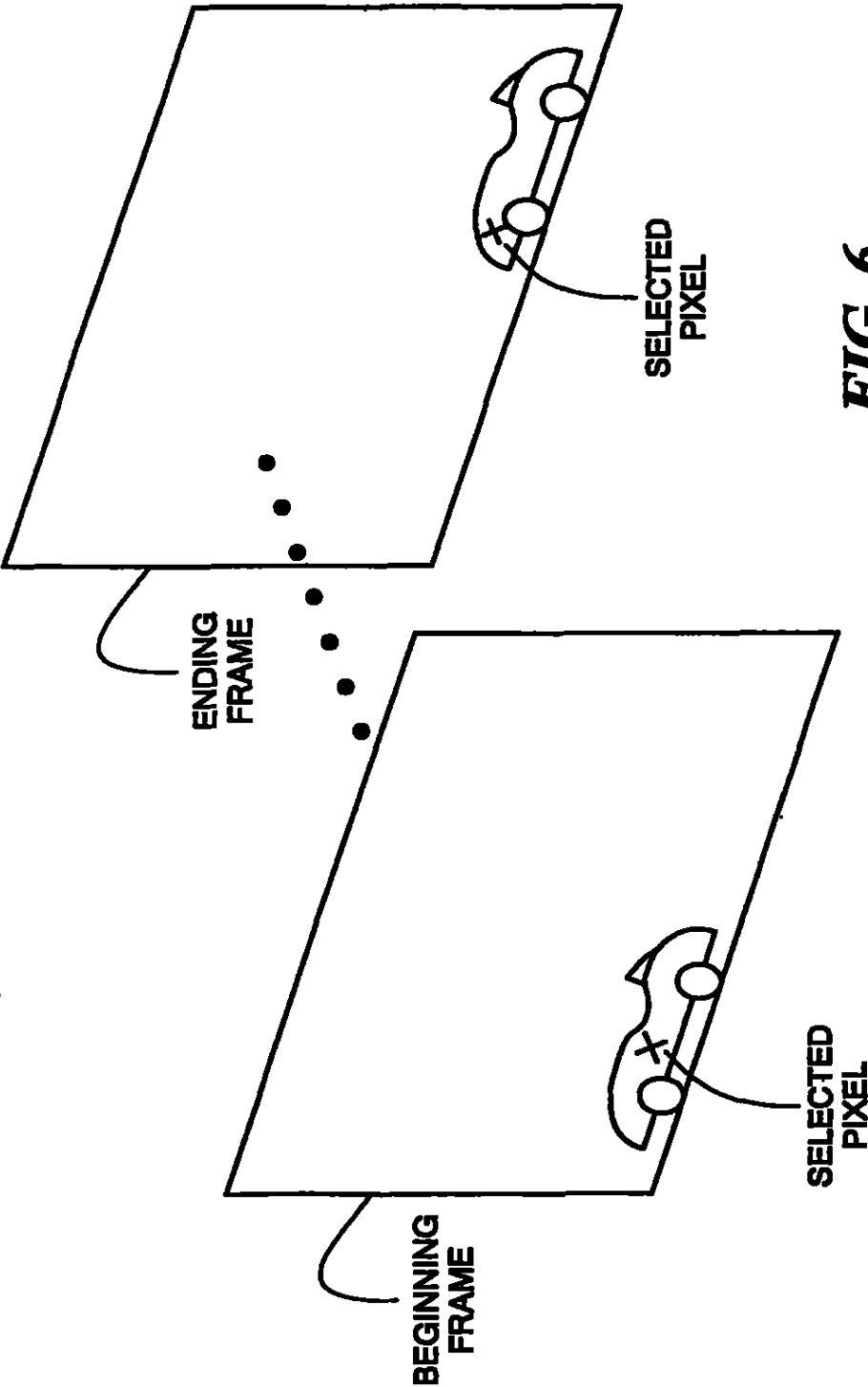


FIG. 6

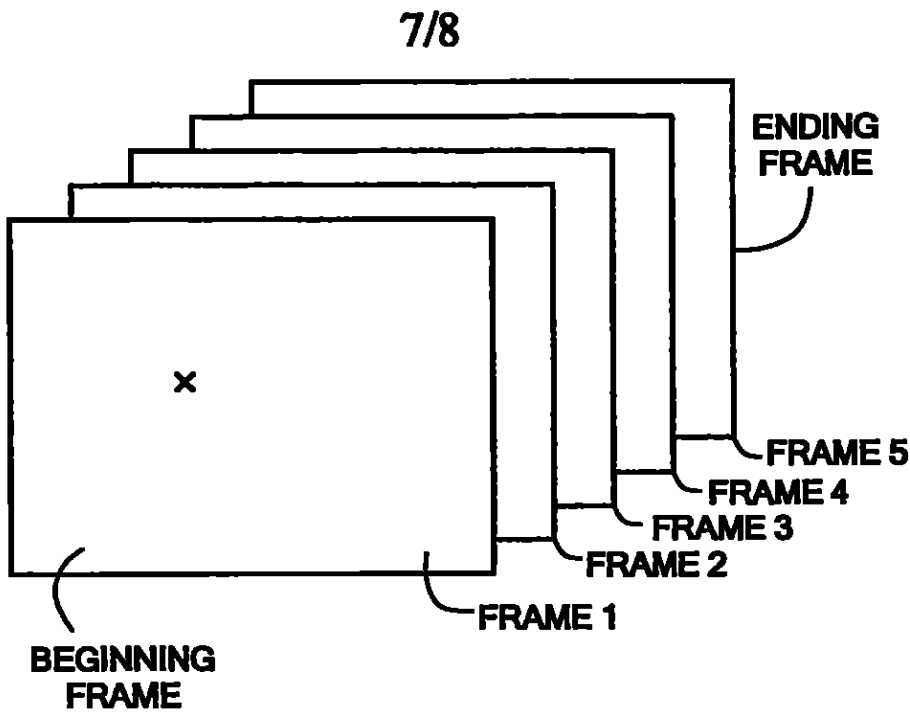


FIG. 7A

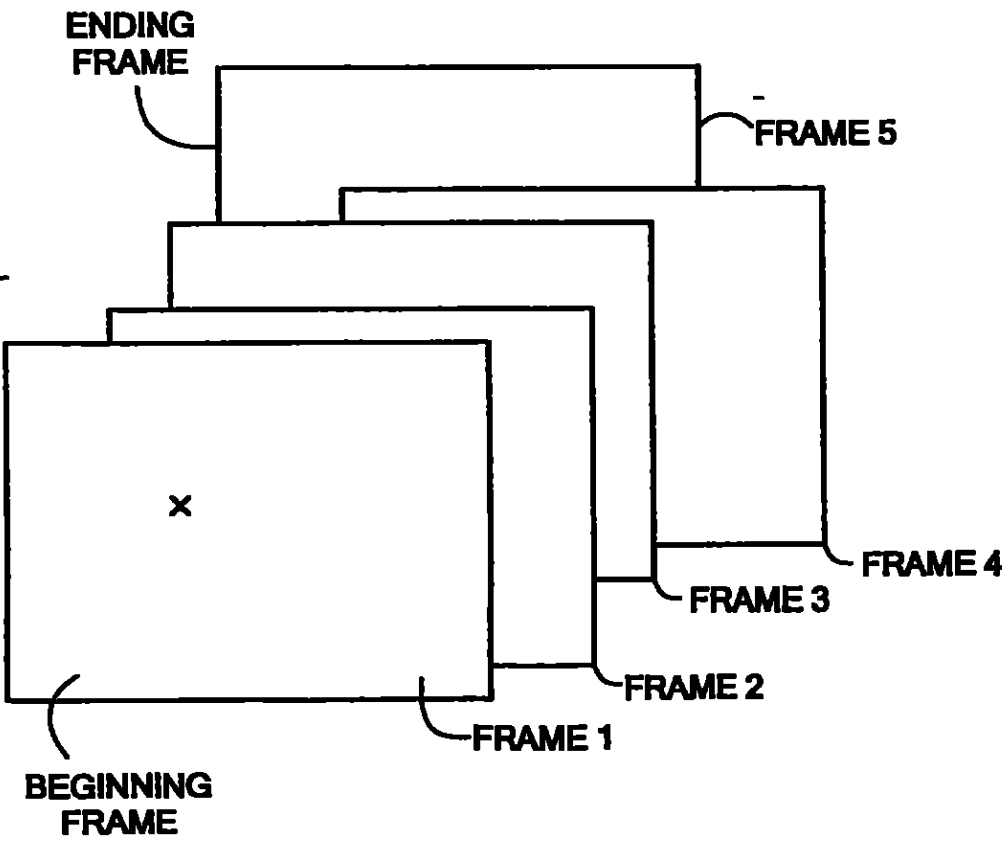


FIG. 7B

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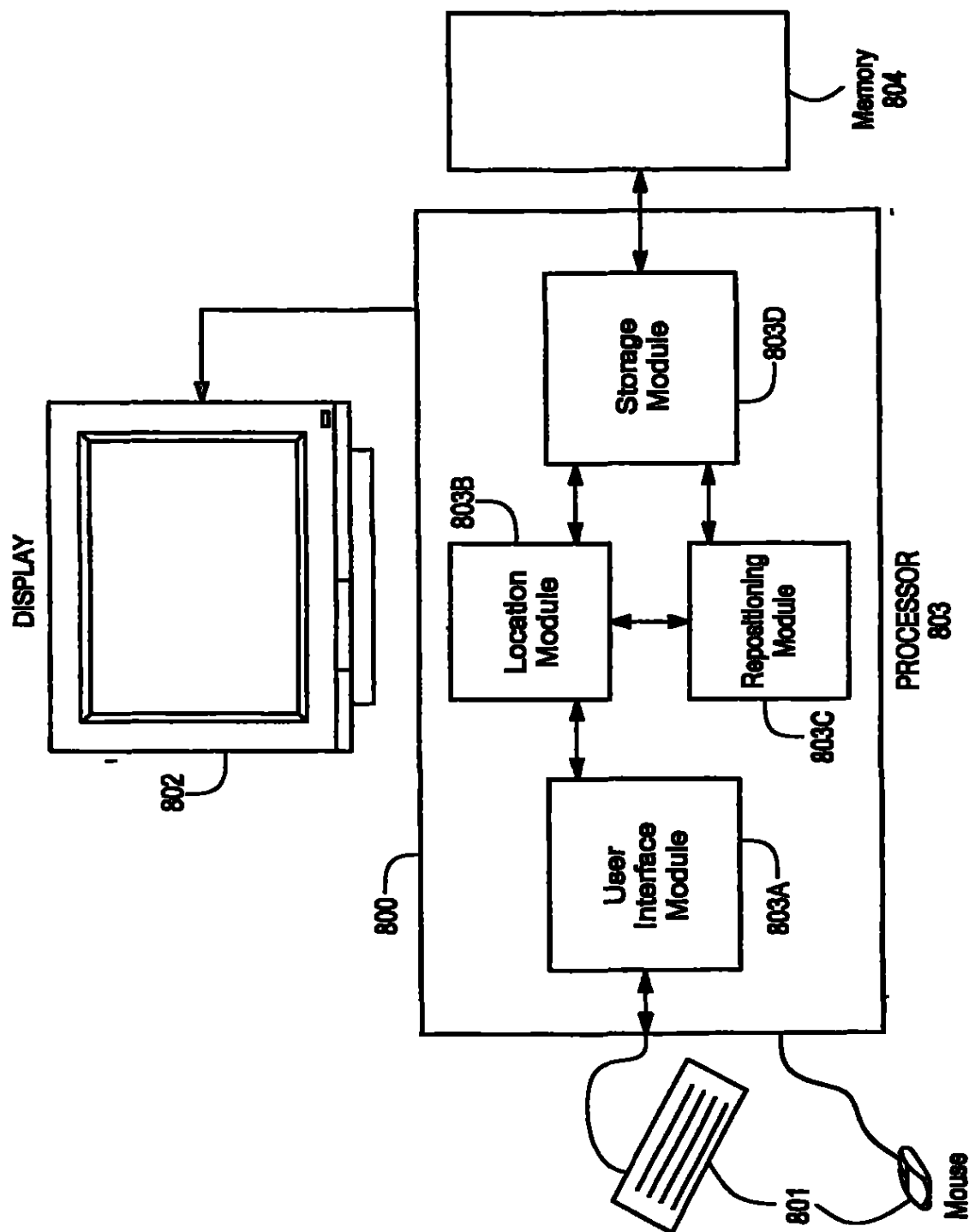


FIG. 8

INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/US 02/28352

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/232

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N 606T

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

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

EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GUESTRIN C ET AL "Fast software image stabilization with color registration" INTELLIGENT ROBOTS AND SYSTEMS, 1998 PROCEEDINGS, 1998 IEEE/RSJ INTERNATIONAL CONFERENCE ON VICTORIA, BC, CANADA 13-17 OCT 1998, NEW YORK, NY, USA, IEEE, US, 13 October 1998 (1998-10-13), pages 19-24, XP010311349 ISBN 0-7803-4465-0 abstract page 19, left-hand column, line 15 -right-hand column, line 1 page 21, left-hand column, line 15 - line 38 page 24, left-hand column, line 21 - line 28 - - - - -	1,5,18, 20,21, 23,27, 40,42

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents

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

E earlier document but published on or after the international filing date

L document which may throw doubt 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.

Z document member of the same patent family

Date of the actual completion of the international search

6 November 2002

Date of mailing of the international search report

13/11/2002

Name and mailing address of the ISA

European Patent Office, P.O. 5818 Patentplan 2
NL - 2280 HV Rijswijk
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Fax (+31-70) 340-3016

Authorized officer

Wentzel, J

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 02/28352

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 794 880 A (CROCHAT PHILIPPE) 15 December 2000 (2000-12-15) page 1, line 10 -page 3, line 24 page 6, line 25 -page 9, line 2	1,5,18, 20,21, 23,27, 40,42
A	EP 0 613 020 A (SONY CORP) 31 August 1994 (1994-08-31) page 4, line 53 -page 7, line 4	1,5,18, 20,21, 23,27, 40,42
A	US 5 892 546 A (OHSAMA HIDEFUMI ET AL) 6 April 1999 (1999-04-06) column 1, line 27 - line 65 column 7, line 53 -column 8, line 2 column 9, line 18 - line 45	1,5,18, 20,21, 23,27, 40,42

INTERNATIONAL SEARCH REPORT
 Information on patent family members

International application No
PCT/US 02/28352

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2794880	A	15-12-2000	FR 2794880 A1	15-12-2000
EP 0613020	A	31-08-1994	CN 1102028 A ,B	26-04-1995
			DE 69426428 D1	25-01-2001
			DE 69426428 T2	07-06-2001
			EP 0613020 A1	31-08-1994
			JP 6311410 A	04-11-1994
			US 5473369 A	05-12-1995
US 5892546	A	06-04-1999	JP 3143494 B2	07-03-2001
			JP 5007371 A	14-01-1993
			JP 5007372 A	14-01-1993
			JP 3230530 B2	19-11-2001
			JP 5046683 A	26-02-1993
			US 5900910 A	04-05-1999
			DE 69229146 D1	17-06-1999
			DE 69229146 T2	28-10-1999
			EP 0520765 A2	30-12-1992

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PATENT COOPERATION TREATY

32

BROMBERG & SUNSTEIN

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BROMBERG & SUNSTEIN LLP
Attn Stickevers, John J
125 Summer Street
Boston, Massachusetts 02110-1618
UNITED STATES OF AMERICA

PCT
POCKETED
NOTICE OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)	13/11/2002
Applicant's or agent's file reference 1247/A65 WO	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US 02/ 28352	International filing date (day/month/year) 06/09/2002
Applicant INTERGRAPH HARDWARE TECHNOLOGIES COMPANY	

- 1 ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith
- Filing of amendments and statement under Article 18:**
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):
- When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however for more details, see the notes on the accompanying sheet.
- Where?** Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20 Switzerland
Facsimile No. (41-22) 740.14.35
- For more detailed instructions, see the notes on the accompanying sheet.
- 2 ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith
- 3 ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
- 4 Further action(s): The applicant is reminded of the following:
- Shortly after 18 months from the priority date the International application will be published by the International Bureau
If the applicant wishes to avoid or postpone publication a notice of withdrawal of the International application or of the priority claim must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively before the completion of the technical preparations for International publication
- Within 19 months from the priority date a demand for International preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later)
- Within 20 months from the priority date the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II

Name and mailing address of the International Searching Authority

 European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel (+31-70) 340-2040 Tx 31 651 epo nl
Fax (+31-70) 340-3016

Authorized officer

Shantisaroop Pherai

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes "Article", "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the letter to be published for the purpose of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 18 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

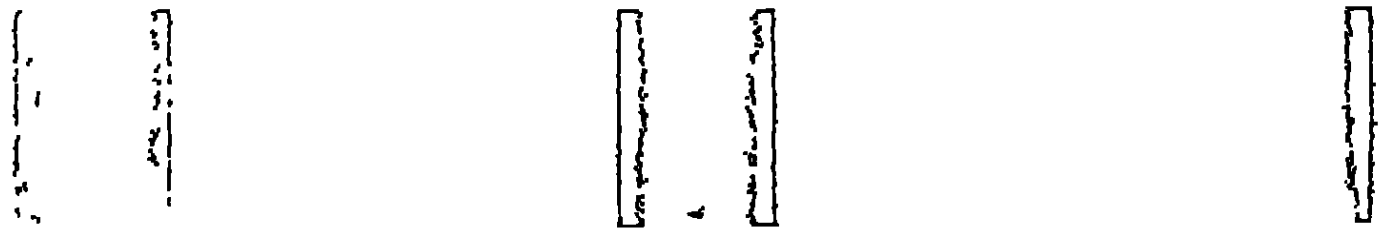
What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English, if the language of the international application is French, the letter must be in French.



NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new
- (iv) the claim replaces one or more claims as filed,
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]
"Claims 1 to 28, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers, claims 30, 33 and 36 unchanged, new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled, new claims 15, 16 and 17 added. or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1, 10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14, claim 17 subdivided into amended claims 15, 16 and 17, new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 48.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Office, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.



INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1247/A65	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below	
International application No. PCT/US 02/ 28352	International filing date (day/month/year) 06/09/2002	(Earliest) Priority Date (day/month/year) 07/09/2001
Applicant INTERGRAPH HARDWARE TECHNOLOGIES COMPANY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item:

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form

☐ filed together with the international application in computer readable form

☐ furnished subsequently to this Authority in written form

☐ furnished subsequently to this Authority in computer readable form

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I)

3. ☐ Unity of invention is lacking (see Box II)

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows.

IMAGE STABILIZATION USING COLOR MATCHING

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 36.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 8

☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure

☐ because this figure better characterizes the invention.

[Handwritten signature]

[Handwritten text]

[Handwritten text]

[Handwritten text]

INTERNATIONAL SEARCH REPORT

Internat. Application No.
PCT/US 02/28352A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/232

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N G06T

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

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

EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GUESTRIN C ET AL "Fast software image stabilization with color registration" INTELLIGENT ROBOTS AND SYSTEMS, 1998 PROCEEDINGS, 1998 IEEE/RSJ INTERNATIONAL CONFERENCE ON VICTORIA, BC, CANADA 13-17 OCT 1998, NEW YORK, NY, USA, IEEE, US, 13 October 1998 (1998-10-13), pages 19-24, XP010311349 ISBN 0-7803-4465-0 abstract page 19, left-hand column, line 15 -right-hand column, line 1 page 21, left-hand column, line 15 - line 38 page 24, left-hand column, line 21 - line 28 -- -/-	1, 5, 18, 20, 21, 23, 27, 40, 42

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

* Special categories of cited documents

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

E earlier document 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

6 November 2002

Date of mailing of the international search report

13/11/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5816 Patentkan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tlx 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Wentzel, J

INTERNATIONAL SEARCH REPORT

Intern. Application No
PCT/US 02/28352

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 794 880 A (CROCHAT PHILIPPE) 15 December 2000 (2000-12-15) page 1, line 10 -page 3, line 24 page 6, line 25 -page 9, line 2	1,5,18, 20,21, 23,27, 40,42
A	EP 0 613 020 A (SONY CORP) 31 August 1994 (1994-08-31) page 4, line 53 -page 7, line 4	1,5,18, 20,21, 23,27, 40,42
A	US 5 892 546 A (OHSAWA HIDEFUMI ET AL) 6 April 1999 (1999-04-06) column 1, line 27 - line 65 column 7, line 53 -column 8, line 2 column 9, line 18 - line 45	1,5,18, 20,21, 23,27, 40,42

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. Application No

PCT/US 02/28352

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2794880	A	15-12-2000	FR 2794880 A1	15-12-2000
EP 0613020	A	31-08-1994	CN 1102028 A ,B	26-04-1995
			DE 69426428 D1	25-01-2001
			DE 69426428 T2	07-06-2001
			EP 0613020 A1	31-08-1994
			JP 6311410 A	04-11-1994
			US 5473369 A	05-12-1995
US 5892546	A	06-04-1999	JP 3143494 B2	07-03-2001
			JP 5007371 A	14-01-1993
			JP 5007372 A	14-01-1993
			JP 3230530 B2	19-11-2001
			JP 5046683 A	26-02-1993
			US 5900910 A	04-05-1999
			DE 69229146 D1	17-06-1999
			DE 69229146 T2	28-10-1999
			EP 0520765 A2	30-12-1992

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PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) 1247/A65 WO

Box No. I TITLE OF INVENTION

METHOD, DEVICE AND COMPUTER PROGRAM PRODUCT FOR IMAGE STABILIZATION USING COLOR MATCHING

Box No. II APPLICANT

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

INTERGRAPH HARDWARE TECHNOLOGIES COMPANY
2325B Renaissance Drive
Suite #16
Las Vegas, NV 89119
USA

☐ This person is also inventor

Telephone No.

702-968-5208

Facsimile No.

Teletypewriter No.

State (that is, country) of nationality

US

State (that is, country) of residence

US

This person is applicant for the purposes of:



all designated States



all designated States except the United States of America



the United States of America only



the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

GRINDSTAFF, Gene Arthur
2202 Essex Drive SW
Decatur, AL 35603
US

This person is:

☐ applicant only

☐ applicant and inventor

☒ inventor only (if this check-box is marked, do not fill in below.)

State (that is, country) of nationality

State (that is, country) of residence

This person is applicant for the purposes of:



all designated States



all designated States except the United States of America



the United States of America only



the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE, OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as



agent



common representative

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)

STICKEVERS, John J, SUNSTEIN, Bruce D, ASHER, Robert M, MURPHY, Timothy M., SAUNDERS, Steven G, STRIMPEL, Harriet M., BUCHANAN, Karen A, PETUCHOWSKI, Samuel J, KLAYMAN, Jeffrey T, MORANO, Elizabeth P, SANDVOS, Jay, WOOD, Keith J, SMOLENSKI, JR Alexander J, CONWAY, John L, CHIRNOMAS, Morton
Bronberg & Sunstein LLP
125 Summer Street
Boston, MA 02110-1618
US

Telephone No.

617-443-9292

Facsimile No.

617-443-0004

Teletypewriter No.

☐ Address for correspondence. Mark this check box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

DOCKETED

EV101936572US
AS 201
13

IN THE UNITED STATES RECEIVING OFFICE (RO/US)

Applicant Intergraph Hardware Technologies Company
Int'l Application No PCT/US02/28352
Int'l Filing Date 06 September 2002
Title of Invention Method, Device and Computer Program Product for Image Stabilization Using Color Matching
Atty Docket 1247/A65 WO
Date Mailed 28 October 2002

Commissioner for Patents
BOX PCT
Washington, DC 20231
Attn RO/US

EXPRESS MAIL CERTIFICATE

Express Mail No EV 101936572 US
Date of Mailing 28 October 2002

I hereby certify that the attached papers listed below are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to the Commissioner for Patents, Box PCT, Washington, DC 20231, Attention RO/US

Enclosed documents

- 1 Response to Invitation to Correct Defects,
- 2 8 sheets of formal drawings for figures 1-8,
- 3 Request for Correction of Inventor's Address,
- 4 Replacement sheet 1 of Request indicating title of application in Box No 1, and
- 5 return postcard

John J. Stuckevers

Typed named of person mailing

John J. Stuckevers
Signature of person mailing

01247/A65WO 224263 I

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IN THE UNITED STATES RECEIVING OFFICE (RO/US)

Applicant Intergraph Hardware Technologies Company
Int'l Application No PCT/US02/28352
Int'l Filing Date 06 September 2002
Title of Invention Method, Device and Computer Program Product for Image
Stabilization Using Color Matching
Atty Docket 1247/A65 WO
Date Mailed 28 October 2002

Commissioner for Patents
BOX PCT
Washington, DC 20231
Attn RO/US

RESPONSE TO INVITATION TO CORRECT DEFECTS

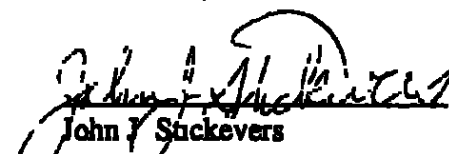
In response to the Invitation to Correct Defects in the International Application dated 26 September 2002 (a copy of which is attached), the undersigned has enclosed the following documents for filing

- 1 8 sheets of formal drawings for figures 1-8,
- 2 Request for Correction of Inventor's Address, and
- 3 Replacement sheet 1 of Request indicating title of application in Box No 1

Remarks

The enclosures are now believed to be in proper form, and accordingly processing of the above-referenced application to publication and in accordance with the Patent Cooperation Treaty is hereby requested. If any additional fees are required, please charge them to deposit account 19-4972.

Respectfully submitted,


John F. Stickevers
Attorney for Applicant
Registration No 39,387

BROMBERG & SUNSTEIN LLP
125 Summer Street
Boston, MA 02110-1618
(617) 443-9292

01247/A65WO 224263 1



PATENT COOPERATION TREATY

From the RECEIVING OFFICE

To:

JOHN J STICKEVERS
BROMBERG & SUNSTEIN LLP
125 SUMMER STREET
BOSTON, MASSACHUSETTS 02110-1818

DOCKETED**PCT**INVITATION TO CORRECT DEFECTS IN
THE INTERNATIONAL APPLICATION

(PCT Articles 3(4)(I) and 14(1) and Rule 26)

Date of mailing (day/month/year)		28 Sep 2002
Applicant's or agent's file reference 1247/A85 WO		REPLY DUE within <u>1</u> months / days from the above date of mailing
International application No. PCT/US02/28352		International filing date (day/month/year) 08 Sep 2002
Applicant INTERGRAPH HARDWARE TECHNOLOGIES COMPANY		

- 1 The applicant is hereby invited, within the time limit indicated above, to correct the defects in the international application as filed, the defects specified on the attached



Annex A



Annex B1 (text matter of the international application as filed)



Annex C1 (drawings of the international application as filed)

- 2 The applicant is hereby invited, within the time limit indicated above, to correct the defects in the translation of the international application furnished under Rule 12.3, the defects specified on the attached



Annex A



Annex B2 (text matter of the translation of the international application)



Annex C2 (drawings of the translation of the international application)

Additional observations (if necessary):

HOW TO CORRECT THE DEFECTS?

Correction must be submitted by filing a replacement sheet embodying the correction and a letter accompanying the replacement sheet, which shall draw attention to the difference between the replaced sheet and the replacement sheet. A correction may be stated in a letter only if it is of such a nature that it can be transferred from the letter to the record copy without adversely affecting the clarity and direct reproducibility of the sheet onto which the correction is to be transferred (Rule 26.4(a)).

ATTENTION

Failure to correct the defects will result in the international application being considered withdrawn by this receiving Office (see Rule 26.5 for further details).

A copy of this invitation and any attachments has been sent to the International Bureau



and the International Searching Authority

Name and mailing address of the receiving Office Assistant Commissioner for Patent, Box PCT Washington, D.C. 20231 Am.RO/US	Authorized officer MELVIN BROOKS, Sr
Facsimile No. 703-305-3230	Telephone No. (703) 305-5163

Form PCT/RO/106 (July 1998)

ANNEX A TO FORM PCT/RO/106

International application No.
PCT/US02/28352

The receiving Office has found the following defects in the international application as filed.

1. As to signature* of the international application (Rules 4.13 and 90.4), the request.
- a. ☐ is not signed.
 - b. ☐ is not signed by all applicants.
 - c. ☐ is not accompanied by the statement referred to in the check list in Box No. VIII of the request explaining the lack of the signature of an applicant for the designation of the United States of America.
 - d. ☐ is signed by what appears to be an agent/common representative but
 - ☐ the international application is not accompanied by a power of attorney appointing him.
 - ☐ the power of attorney accompanying the international application was not signed by all the applicants.
 - e. ☐ other (specify):

* All applicants must sign, including inventors if they are also applicants (e.g. where the United States of America is designated).

2. As to indications concerning the applicant, the request (Rules 4.4 and 4.5):

- a. ☐ does not properly indicate the applicant's name (specify):
- b. ☐ does not indicate the applicant's address.
- c. ☐ does not properly indicate the applicant's address (specify):
- d. ☐ does not indicate the applicant's nationality
- e. ☐ does not indicate the applicant's residence.
- f. ☐ other (specify):

3. As to the language of certain elements of the international application, other than the description and claims (Rules 12.1(e) and 26.3ar(a) and (e)).

- a. ☐ the request is not in a language which is both a language accepted by this receiving Office and a language of publication, which is (are):
- b. ☐ the text matter of the drawings is not in the language in which the international application is to be published, which is:
- c. ☐ the abstract is not in the language in which the international application is to be published, which is:

4. The title of the invention.

- a. ☒ is not indicated in Box No. I of the request (Rule 4.1(a)).
- b. ☐ is not indicated at the top of the first sheet of the description (Rule 5.1(a)).
- c. ☐ as appearing in Box No. I of the request is not identical with the title heading the description (Rule 5.1(a)).

5. As to the abstract (Rule 8)

- ☐ the international application does not contain an abstract.

The receiving Office has found that, with regard to the presentation of the drawings of the international application as filed, the physical requirements are not complied with to the extent that compliance therewith is necessary for

- 1 ☐ reasonably uniform international publication (Rules 11 and 26.3(a)(i)) (defects to be specified).

Sheets containing drawings

- a ☐ the sheets do not admit of direct reproduction.
- b ☐ the sheets are not free from creases, cracks, folds.
- c ☐ one side of the sheets is not left unused.
- d ☐ the paper of the sheets is not flexible/strong/white/smooth/non-shiny/durable.
- e ☐ the drawings do not commence on a new sheet.
- f ☐ the sheets are not connected as prescribed (Rule 11.4(b)).
- g ☐ the sheets are not A4 size (29.7cm x 21 cm).
- h ☒ the minimum margins on the sheets are not as prescribed (top: 2.5cm; left side: 2.5cm; right side: 1.5cm, bottom: 1 cm).
- i ☐ the file reference number indicated on the sheets does not appear in the left-hand corner of the sheets, within 1.5cm of the top of the sheets.
- j ☐ the file reference number exceeds the maximum of 12 characters.
- k ☐ the sheets are not free from lines around usable or used surfaces.
- l ☒ the sheets are not numbered in consecutive Arabic numerals (e.g. 1/3, 2/3, 3/3).
- m ☐ the sheet numbers are not centered at the top or bottom of the sheets.
- n ☐ the sheet numbers are in the margin (see h. above for the size of the margins).
- o ☐ the sheets contain alterations/overwritings/interlineations/ too many erasures.
- p ☐ the sheets contain photocopy marks.

Drawings (Rule 11-13):

- a ☐ do not admit of direct reproduction.
- b ☐ contain unnecessary text matter
- c ☐ contain words so placed as to prevent translation without interference with lines thereof.
- d ☒ are not executed in durable black color; the lines are not uniformly thick and well-defined.
- e ☐ contain cross-sections not properly hatched.
- f ☐ would not be properly distinguishable in reduced reproduction.
- g ☐ contain scales not represented graphically
- h ☒ contain numbers, letters and reference lines lacking simplicity and clarity
- i ☐ contain lines drafted without the aid of drafting instruments.
- j ☐ contain disproportionate elements of a figure not necessary for clarity
- k ☐ contain numbers and letters of height less than 0.33 cm.
- l ☐ contain letters not conforming to the Latin, and where customary Greek alphabets.
- m ☐ contain figures on two or more sheets which form a single complete figure but which are not able to be assembled without concealing parts thereof
- n ☐ contain figures which are not properly arranged and clearly separated.
- o ☐ contain different figures not numbered in consecutive Arabic numerals.
- p ☐ contain different figures not numbered independent of the numbering of the sheets.
- q ☐ are not restricted to reference signs mentioned in the description.
- r ☐ do not contain reference signs that are mentioned in the description.
- s ☐ contain the same feature denoted by different reference signs.
- t ☐ are not arranged in an upright position, clearly separated from one another
- u ☐ are not presented sideways with the top of the figures at the left side of the sheets.

- 2 ☐ satisfactory reproduction (Rules 11 and 26.3(b)(i)).

Further observations (if necessary):

ALL NEW DRAWINGS REQUIRED

JD

IN THE UNITED STATES RECEIVING OFFICE (RO/US)

Applicant	Intergraph Hardware Technologies Company
Int'l Application No	PCT/US02/28352
Int'l Filing Date	06 September 2002
Title of Invention	Method, Device and Computer Program Product for Image Stabilization Using Color Matching
Atty Docket	1247/A65 WO
Date Mailed	28 October 2002

Commissioner for Patents
BOX PCT
Washington, DC 20231
Attn RO/US

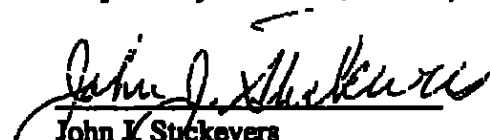
REQUEST FOR CORRECTION OF INVENTOR'S ADDRESS

Inventor Therman Ward McKay III's address has changed The correct address is as follows

MCKAY III, Therman Ward
15122 Kings Dr
Atehrs, AL 35611
US

Applicant hereby requests that the US/RO correct this accordingly so that all future correspondence reflects the correct address

Respectfully submitted,


John K. Stuckevers
Attorney for Applicant
Registration No 39,387

BROMBERG & SUNSTEIN LLP
125 Summer Street
Boston, MA 02110-1618
(617) 443-9292

01247/A65WO 224263 1

[1]

[]

Practitioner's Docket No. 1247/A65 WO

DOCKETED

CHAPTER II

IN THE UNITED STATES INTERNATIONAL PRELIMINARY
EXAMINATION AUTHORITY (IPEA/US)

PCT/US02/28352

06 September 2002 (6.09 02)

07 September 2001 (7.09 01)

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

Method, Device and Computer Program Product for Image Stabilization Using Color Matching

TITLE OF INVENTION

INTERGRAPH HARDWARE TECHNOLOGIES COMPANY

APPLICANT(S)

Box PCT

Commissioner for Patents

Washington, D.C. 20231

ATTENTION IPEA/US

EXPRESS MAILING UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory)

(Express Mail certification is optional)

I hereby certify that this paper along with any document referred to, is being deposited with the United States Postal Service on this date, 21 January 2003, in an envelope addressed to the Commissioner for Patents, Washington D.C. 20231 as "Express Mail Post Office to Addressee" Mailing Label No. EV 101936073 US.

John J. Sticklevers

Type or print name of person mailing paper

Date: 21 January 2003

Signature of person certifying

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing 37 C.F.R. 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439 at 56,442.

The demand must be filed directly with the competent International Preliminary Examining Authority or if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below.

IPEA/US

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated)

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 1247/A65 WO	
International application No. PCT/US02/28352	International filing date (day/month/year) 6 September 2002 (06 09 02)	(Earliest) Priority date (day/month/year) 7 September 2001 (07 09 01)	
Title of invention Method, Device and Computer Program Product for Image Stabilization Using Color Matching			
Box No. II APPLICANT(S)			
Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.) INTERGRAPH HARDWARE TECHNOLOGIES COMPANY 2325B Renaissance Drive Suite #16 Las Vegas, NV 89119 US		Telephone No. 702-968-5208	
		Facsimile No.	
		Teleprinter No.	
		Applicant's registration No. with the Office	
State (that is, country) of nationality US		State (that is, country) of residence US	
Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)			
State (that is, country) of nationality		State (that is, country) of residence:	
Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)			
State (that is, country) of nationality		State (that is, country) of residence:	
☐ Further applicants are indicated on a continuation sheet.			

Box No. III AGENT OR COMMON REPRESENTATIVE, OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority in addition to the agent(s)/common representative appointed earlierName and address (Family name followed by given name for a legal entity, full official designation.
The address must include postal code and name of country.)SUNSTEIN, Bruce D, ASHER, Robert M., MURPHY, Timothy M SAUNDERS,
Steven G, PETUCHOWSKI, Samuel J, KLAYMAN, Jeffrey T, STICKEVERS,
John J, MORANO, Elizabeth P, SANDVOS, Jay, SMOLENSKI, JR Alexander J,
CONWAY, John L; CHIRNOMAS, Morton, CARTER, Barbara J
BROMBERG & SUNSTEIN LLP125 Summer Street
Boston, MA 02110-1618
US

Telephone No.

617-443-9292

Facsimile No.

617-443-0004

Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments.*

1 The applicant wishes the international preliminary examination to start on the basis of:

☐ the international application as originally filed

the description

☐ as originally filed☐ as amended under Article 34

the claims

☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34

the drawings

☐ as originally filed☐ as amended under Article 342 ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3 ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69 1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination. English .

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby elects all eligible States (that is all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV for the purposes of international preliminary examination:

- | | |
|--|--------|
| 1 translation of international application | sheets |
| 2 amendments under Article 34 | sheets |
| 3 copy (or where required, translation) of amendments under Article 19 | sheets |
| 4 copy (or where required, translation) of statement under Article 19 | sheets |
| 5 letter | sheets |
| 6 other (specify) | sheets |

For international Preliminary Examining Authority use only

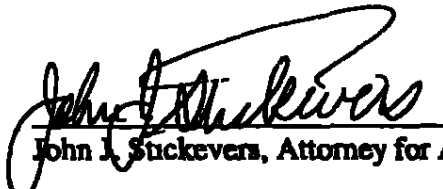
- | received | not received |
|--------------------------|--------------------------|
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |

The demand is also accompanied by the item(s) marked below

- | | |
|---|--|
| 1 ☒ fee calculation sheet | 5 ☐ statement explaining lack of signature |
| 2 ☐ original separate power of attorney | 6 ☐ sequence listings in computer readable form |
| 3 ☐ original general power of attorney | 7 ☐ tables in computer readable form related to sequence listings |
| 4 ☐ copy of general power of attorney, reference number if any | 8 ☐ other (specify): |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).


John J. Stickevers, Attorney for Applicant

For International Preliminary Examining Authority use only

1 Date of actual receipt of DEMAND:

2 Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3 ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5 below does not apply

☐ The applicant has been informed accordingly

4 ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5

5 ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

FEE CALCULATION SHEET

Annex to the Demand

International application No. PCT/US02/28352	For International Preliminary Examining Authority use only
Applicant's or agent's file reference 1247/A65 WO	Date stamp of the IPEA
Applicant INTERGRAPH HARDWARE TECHNOLOGIES COMPANY	
CALCULATION OF PRESCRIBED FEES	
1 Preliminary examination fee	750 P
2 Handling fee (Applicants from certain States are entitled to a reduction of 75% of the handling fee Where the applicant is (or all applicants are) so entitled, the amount to be entered as H is 25% of the handling fee)	146 00 H
3 Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box	USD 896.00 TOTAL
MODE OF PAYMENT	
☐ authorization to charge deposit account with the IPEA (see below)	☐ cash
☒ cheque	☐ revenue stamps
☐ postal money order	☐ coupons
☐ bank draft	☐ other (specify):
AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT <i>(This mode of payment may not be available at all IPEAs)</i>	
☐ Authorization to charge the total fees indicated above.	IPEA/ <u>US</u>
☒ (This check-box may be marked only if the conditions for deposit accounts of the IPEA so permits) Authorization to charge any deficiency or credit any overpayment in the total fees indicated above	Deposit Account No. <u>19-4972</u>
	Date <u>21 January 2003</u>
	Name <u>John J. Stuckevers</u>
	Signature <u><i>John J. Stuckevers</i></u>

DOCKETED

MARCH 05, 2002

RECEIVED

BROMBERG & SUNSTEIN LLP
JOHN L. CONWAY
125 SUMMER STREET
BOSTON, MA 02110

MAR 11 2002

BROMBERG & SUNSTEIN

56
Chief Information Officer
Washington, DC 20231
www.uspto.gov



101942642A

**UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT**

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U S PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO U S PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D C 20231.

RECORDATION DATE 01/07/2002

REEL/FRAME 012441/0671
NUMBER OF PAGES 5

BRIEF ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS)

ASSIGNOR

MCKAY, THERMAN WARD III

DOC DATE 11/15/2001

ASSIGNOR

GRINDSTAFF GENE

DOC DATE 11/16/2001

ASSIGNOR

FLETCHER, SUSAN HEATH CALVIN

DOC DATE 11/15/2001

ASSIGNEE

INTERGRAPH CORPORATION
ONE MADISON INDUSTRIAL PARK
HUNTSVILLE, ALABAMA 35894-0001

SERIAL NUMBER 60318164
PATENT NUMBER

FILING DATE 09/07/2001
ISSUE DATE

57
JZ

PEARLENE FOSTER, PARALEGAL
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

1-1-4

1-1-4

1

1-1-4

1

1-1-4

1-1-4

1-1-4

01-14-2002

58
U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office



101942642

1-7-02
attached original documents or copy thereof.

To the Honorable Commissioner of Patent

1 Name of conveying party(ies)

Therman Ward McKay III

Gene Arthur Grindstaff

Susan Heath Calvin Fletcher

Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3 Nature of conveyance

- ☒ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Other

Execution Date, November 16, 2001

2 Name and address of receiving party(ies)

Name:

Intergraph Corporation

Internal Address:

Street Address: One Madison Industrial Park

City: Huntsville

State: AL

ZIP: 35894-0001

Additional name(s) & address(es) attached? ☐ Yes ☒ No

4. Application number(s) or patent number(s).

If this document is being filed together with a new application, the execution date of the application is

A. Patent Application No (s)

60/318,164

MAR 11 2002

BROMBERG & SUNSTEIN

Additional numbers attached? ☐ Yes ☒ No

B Patent No (s)

JAN - 7 2002

5. Name and address of party to whom correspondence concerning document should be mailed

Name: John L. Conway

Internal Address: Bromberg & Sunstein LLP

Street Address: 125 Summer Street

City: Boston State: MA ZIP: 02110

6 Total number of applications and patents involved.

1

7 Total fee (37 CFR 3.41) \$ 40.00

☐ Enclosed

☒ Authorized to be charged to deposit account

8 Deposit account number

19-4972

(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9 Statement and signature

To the best of my knowledge and belief the foregoing information is true and correct and any attached copy is a true copy of the original document

John L. Conway

Name of Person Signing

Signature

December 12, 2001

Date

Total number of pages including cover sheet, attachments, and document: 3

11/14/2002 070011 00000121 194972 60318164

11-FC-001

40.00 CH

Mail documents to be recorded with required cover sheet information to:
Commissioner of Patents & Trademarks, Box Assignments
Washington, D.C. 20531

(Form PTO-1595-Recordation Form Cover Sheet - page 1 of 3)

59

ASSIGNMENT

ASSIGNORS.

Therman Ward McKay III
Gene Arthur Grindstaff
Susan Heath Calvin Fletcher

ASSIGNEE.

Intergraph Corporation
One Madison Industrial Park
Huntsville, AL 35894-0001

STATE OF INCORPORATION OF ASSIGNEE. Delaware

TITLE.

Method, Device and Computer Program Product for Analysis of
Video Images

ATTORNEY DOCKET:

1247/A62

APPLICATION NO..

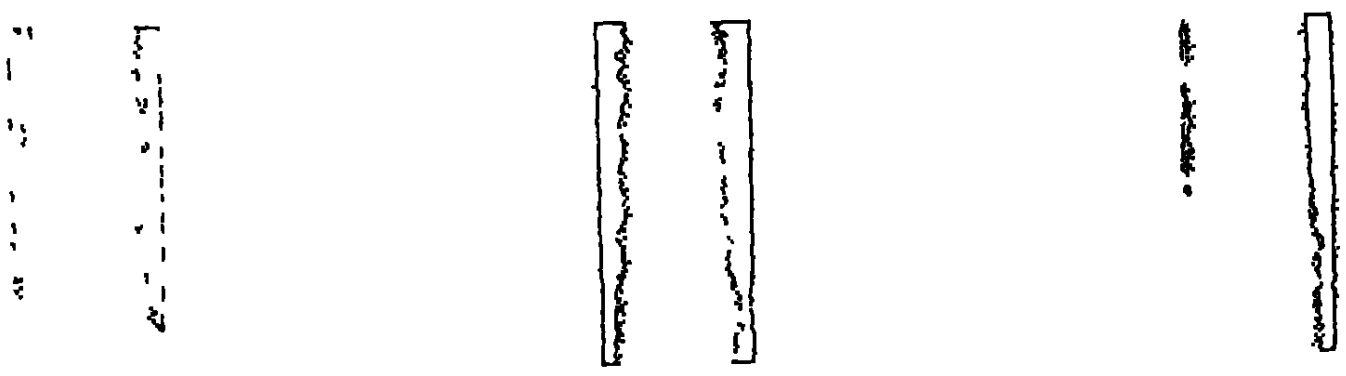
60/318,164

FILED

September 7, 2001

Assignor is an inventor of a certain new and useful invention (the "Invention") described in a United States patent application (the "Application") bearing the above attorney docket number and having the above title. If a filing date and application number are shown, the Application has a Patent and Trademark Office filing date and application number as indicated above.

For valuable consideration, receipt of which is acknowledged, each Assignor hereby assigns to Assignee (which term shall include Assignee's successors and assigns), all of Assignor's right, title and interest in the Invention, all improvements therein, the Application and all priority rights arising therefrom, and any patents, and any reissues and extensions thereof, which issue in any country upon any patent applications which correspond with any of the following the Application, any application that claims priority from the Application (including as a divisional, continuation-in-whole or continuation-in-part, or as an application claiming priority from a



60

provisional application), or any application based in whole or in part on any of the foregoing.
Each Assignor further agrees that such Assignor and Assignor's heirs and legal representatives will, without further consideration, cooperate with Assignee in the prosecution of all of the above applications, execute, verify, acknowledge and deliver all such further papers, including applications for patents and for reissues and extensions therefor, and instruments of assignment and transfer thereof, and will communicate any facts known to Assignor relating to the Invention, to obtain or maintain or enforce patents for the Invention and improvements therein in any and all countries and to vest title thereto in Assignee. Each Assignor further agrees that such Assignor will, without further compensation to Assignor during the term of such Assignor's employment by Assignee and thereafter for reasonable compensation as determined by Assignee, perform such other acts as may be reasonably required when requested by Assignee, including attending depositions, preparing and executing declarations and affidavits and testifying as a witness, to obtain or maintain or enforce patents for the Invention and improvements therein in any and all countries and to vest title thereto in Assignee.

1

1

IN WITNESS WHEREOF, each Assignor hereby executes this instrument on the date set forth below

Date Nov. 15, 2001

Therman Ward McKay III
Therman Ward McKay III, Assignor

STATE OF ALABAMA

COUNTY OF MADISON

)
) ss.
)

Before me, a notary public in and for said county and state, personally appeared Therman Ward McKay III, to me known to be the person described in the foregoing instrument, who, being first duly sworn, acknowledged his signature on the foregoing instrument in my presence and declared the same to be his free act and deed on the date written above opposite his signature.

Drenda M. Col
Notary Public
My Commission Expires. 1-20-2004

(seal)

Date Nov. 16, 2001

Gene Arthur Grindstaff
Gene Arthur Grindstaff, Assignor

STATE OF ALABAMA

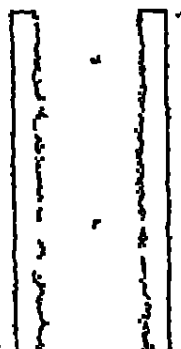
COUNTY OF MADISON

)
) ss.
)

Before me, a notary public in and for said county and state, personally appeared Gene Arthur Grindstaff, to me known to be the person described in the foregoing instrument, who, being first duly sworn, acknowledged his signature on the foregoing instrument in my presence and declared the same to be his free act and deed on the date written above opposite his signature.

Drenda M. Col
Notary Public
My Commission Expires. 1-20-2004

(seal)



Date. Nov. 15, 2001

Susan Heath Calvin Fletcher
Susan Heath Calvin Fletcher, Assignor

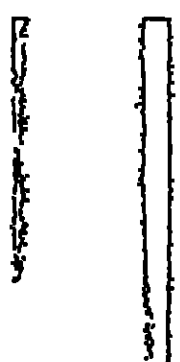
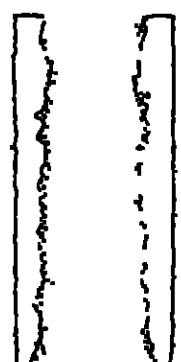
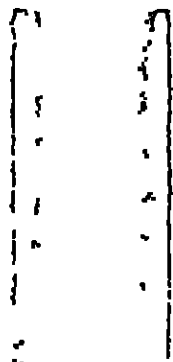
STATE OF ALABAMA

COUNTY OF MADISON

Before me, a notary public in and for said county and state, personally appeared Susan Heath Calvin Fletcher, to me known to be the person described in the foregoing instrument, who, being first duly sworn, acknowledged his signature on the foregoing instrument in my presence and declared the same to be his free act and deed on the date written above opposite his signature.

Dwenda M. Coy
Notary Public
My Commission Expires. 1-20-2004

(seal)



PATENT COOPERATION TREATY

DOCKETED

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITYTo
JOHN J STICKEVERS
BROMBERG & SUNSTEIN LLP
125 SUMMER STREET
BOSTON MA 02110-1618

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of Mailing
(day/month/year)

08 OCT 2003

Applicant's or agent's file reference

1247/A65 WO

REPLY DUE

within 2 months/days from
the above date of mailing

International application No

PCT/US02/28352

International filing date (day/month/year)

06 September 2002 (06 09 2002)

Priority date (day/month/year)

07 September 2001 (07 09 2001)

International Patent Classification (IPC) or both national classification and IPC

IPC(7) H04N 5/228 G06K 9/32 and US CI 348/208 6 382/294

Applicant

INTERGRAPH HARDWARE TECHNOLOGIES COMPANY

1 This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority

2 This opinion contains indications relating to the following items

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66 2 (a)(ii) with regard to novelty inventive step or industrial applicability citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3 The applicant is hereby invited to reply to this opinion

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension. See rule 66.2(d).~~

How? By submitting a written reply accompanied, where appropriate by amendments according to Rule 66 3 For the form and the language of the amendments, see Rules 66 8 and 66 9

Also For an additional opportunity to submit amendments see Rule 66 4 For the examiner's obligation to consider amendments and/or arguments see Rule 66 4 bis For an informal communication with the examiner see Rule 66.6

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69 2 is 07 January 2004 (07 01 2004)

Name and mailing address of the IPEA/US

Mail Stop PCT Attn. IPEA/US
Commissioner for Patents
P O Box 1450
Alexandria Virginia 22313-1450

Facsimile No. (703)305-3230

Authorized officer

Wendy Garber

Telephone No (703) 305-9600

Form PCT/IPEA/408 (cover sheet)(July 1998)

WRITTEN OPINION

International application No

PCT/US02/28352

I Basis of the opinion

1 With regard to the elements of the international application *

- ☒ the international application as originally filed
- ☒ the description
pages 1-12, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____
- ☒ the claims
pages 13-21, as originally filed
pages NONE, as amended (together with any statement) under Article 19
pages NONE, filed with the demand
pages NONE, filed with the letter of _____
- ☒ the drawings
pages 1-8, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____
- ☐ the sequence listing part of the description
pages NONE, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____

2 With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item
These elements were available or furnished to this Authority in the following language _____ which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23 1(b))
- ☐ the language of publication of the international application (under Rule 48 3(b))
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55 2 and/or 55 3)

3 With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing

- ☐ contained in the international application in printed form
- ☐ filed together with the international application in computer readable form
- ☐ furnished subsequently to this Authority in written form
- ☐ furnished subsequently to this Authority in computer readable form
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4 ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos NONE
- ☐ the drawings, sheets/fig NONE

5 ☐ This opinion has been drawn as if (some of) the amendments had not been made since they have been considered to go beyond the disclosure as filed as indicated in the Supplemental Box (Rule 70 2(c))

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"

WRITTEN OPINION

International application No
PCT/US02/28352

V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement

1 STATEMENT

Novelty (N)	Claims 1-42	YES
	Claims NONE	NO
Inventive Step (IS)	Claims 1-42	YES
	Claims NONE	NO
Industrial Applicability (IA)	Claims 1-42	YES
	Claims NONE	NO

2 CITATIONS AND EXPLANATIONS

Claims 1-4 10 12, 14, 16 22-26 33 35 37 and 38 meet the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest providing a color matching range, comparing colors in two successive images to find a pixel match, and repositioning the second image at the address of the pixel match in first image

Claims 5-9, 11 13, 15 17 27-32 34 36 and 39 meet the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest a method for image stabilization of a sequence of images that operates to select a pixel in the beginning and ending images linearly interpolating between the colors for each image in between searching for a color within a predetermined range of colors and repositioning each image.

Claims 18 19 40 and 41 meet the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest receiving a signal representative of a color of a pixel in a first image identifying a pixel in a second image of the same color within a predetermined range, and repositioning the second image so that the pixel resides at the same address as the first image.

Claims 20 and 42 meet the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest interpolating between a color of a pixel in a first image and the color of a pixel in a third image to determine a searchable color then identifying a color in the second image with a threshold range of the color and repositioning the second image according to the first pixel address

Claim 21 meets the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest a repositioning module for readdressing a second video image so that a pixel is located at the pixel location of a pixel of a color within a range in a first image.

Claims 1-42 meet the criteria set out in PCT Article 33(4) and thus have industrial applicability because the subject matter claimed can be made or used in industry

NEW CITATIONS

US 5 973 733 A (GOVE) 26 October 1999
US 5 629 988 A (BURT et al.) 13 May 1997
US 6 122 004 A (HWANG) 19 September 2000
US 5 099 323 A (MORIMURA et al.) 24 March 1992
US 6 002,428 A (MATSUMURA et al.) 14 December 1999
US 5 253 052 A (HANASHIRO et al.) 12 October 1993
US 6 211 913 A (HANSEN et al.) 03 April 2001
MORIMOTO et al "Fast Electronic Digital Image Stabilization" IEEE Proceedings of ICPR '96 1996 284-288
Chen et al "A Novel Structure for Digital Image Stabilizer" IEEE 2000 pgs 101104

WRITTEN OPINION

International application No

PCT/US02/28352

VI Certain document cited

1 Certain published documents (Rule 70 10)

Application No Patent No	Publication Date (day/month/year)	Filing Date (day/month/year)	Priority Date (valid claim) (day/month/year)
US 6,459,822 A	01 October 2002 (01 10.2002)	26 July 1999 (26.07 1999)	26 August 1998 (26.08 1998)
US 6 396 961 B1	28 May 2002 (28 05 2002)	31 August 1998 (31 08 1998)	16 April 1998 (16 04.1998)

2 Non-written disclosures (Rule 70 9)

<u>Kind of non-written disclosure</u>	<u>Date of non-written disclosure</u> (day/month/year)	<u>Date of written disclosure referring to</u> <u>non-written disclosure</u> (day/month/year)
---------------------------------------	---	---

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WRITTEN OPINION

International application No
PCT/US02/28352

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

TIME LIMIT

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d) Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

ESTABILIZACIÓN DE IMAGEN
UTILIZANDO COMPARACIÓN DE COLOR

Campo Técnico

La presente invención se relaciona al análisis de imágenes de video y más específicamente a la estabilización de imagen de imágenes de video

Antecedentes

La estabilización de video es conocido dentro de la técnica anterior para minimizar la fluctuación de la imagen debido al movimiento de la cámara a través ya sea de sistemas de retroalimentación mecánico o a través del procesamiento de señales digitales. Las técnicas de procesamiento de señal digital de la técnica anterior son complicadas y frecuentemente se basan sobre la estimación de movimiento y análisis de vectores. Estas técnicas son diseñadas de tal forma que son mínimamente intrusivas al movimiento dentro de la imagen y evalúan el movimiento de bloques de píxeles con el fin de aislar la fluctuación del movimiento de la cámara.

Cuando los objetos se mueven dentro de las imágenes de video capturadas como opuestas a los detalles de movimiento de la cámara del objeto que se mueve que se captura son frecuentemente difíciles de distinguir. Por ejemplo, la placa de un automóvil en movimiento frecuentemente es difícil de leer cuando las imágenes de video capturadas se muestran debido a la gran cantidad de movimiento de cuadro a cuadro del carro. En tal una situación, un conteo para el movimiento del carro puede mejorar la habilidad para leer la placa del mismo.

Las técnicas de estabilización de imagen tradicional como se discutió anteriormente no suministran una forma de conteo para el movimiento tal como el movimiento del carro con el fin de hacer que la placa sea más legible ya que las técnicas se diseñaron para permitir tal movimiento que sea visible dentro de la secuencia de imágenes de video mientras solo la remoción del movimiento se debe al movimiento de la cámara.



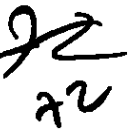
Resumen de la Invención

En una modalidad de la invención, un método para estabilización de imagen de al menos dos imágenes digitales se describe. En tal una modalidad, una primera imagen digital tiene una pluralidad de píxeles y al menos una segunda imagen tiene una pluralidad de píxeles se suministra. Cada píxel tiene una dirección asociada para mostrar y es representativa de un color. Ya sea que un usuario del sistema suministra una dirección asociada para mostrar y es representativa de un color. Ya sea que un usuario del sistema suministra un rango de comparación de color o el sistema suministre un rango comparado de color predeterminado. Un píxel se selecciona dentro de la primer imagen digital. Preferiblemente el píxel es uno que representa un ítem dentro de la imagen que es ya sea borroso debido al movimiento del ítem o aparece fluctuante debido al movimiento de la cámara. Debido al vasto número de colores disponibles un píxel seleccionado en una primera imagen puede ser comparado a un píxel en una segunda imagen dentro de un rango. El rango permite la compensación debido a los cambios de luz. Una vez el píxel en la primer imagen se selecciona este puede ser comparado con todos los píxeles dentro de la segunda

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37

imagen Cada píxel dentro de la segunda imagen que está dentro del rango comparado de color se guarda y es el color del píxel más cercano al píxel desde la primera imagen que se selecciona La dirección de los píxeles en la segunda imagen son luego redirigidas de tal forma que la dirección del píxel localizado en la segunda imagen que tiene el color más cercano al píxel en la primera imagen ahora tiene la misma dirección de exhibición de tal forma que el píxel en la primera imagen La segunda imagen digital reposicionada es luego almacenada en la memoria

En otras modalidades, el área de imagen que va a ser buscada dentro de la segunda imagen puede ser seleccionada mediante un usuario del método En otra modalidad un punto de alineación puede ser seleccionado para alinear la primer imagen digital y la segunda imagen digital reposicionada de tal forma que el píxel del primer cuadro se alinee con el punto de alineación y el píxel en la segunda imagen digital se alinee con el punto de alineación cuando se muestre sobre un dispositivo de exhibición



Una vez la segunda imagen digital sea guardada la primera imagen digital y la segunda imagen digital reposicionada pueden ser mostradas secuencialmente sobre un dispositivo de exhibición en donde el movimiento del ítem será minimizado

En una modalidad adicional, la interpolación puede ser empleada para determinar los valores de color para comparación en una secuencia de imágenes de video. En la secuencia, una imagen digital inicial y una imagen digital final de la secuencia que crea un subconjunto de secuencias se selecciona. Un píxel es el seleccionado en la imagen digital inicial y un píxel es seleccionado en la imagen digital final. La interpolación lineal se desarrolla entre el color del píxel en la imagen digital inicial y el color del píxel en la imagen digital final de tal forma que el color interpolado se determina para cada imagen entre la imagen digital inicial y la imagen digital final. Para cada color interpolado asociado con una imagen, se busca un píxel dentro de tal imagen dentro de un rango predeterminado de colores. Una vez que un píxel es encontrado, cada imagen es reposicionada de tal forma que la dirección del píxel que tiene el color

interpolado es posicionado a la dirección del píxel seleccionado en la imagen que comienza

En ciertas modalidades, el rango de comparación de color puede ser igual a cero, de tal forma que una comparación exacta necesita ser encontrada. El gran número de colores representativos, tales como el color verdadero o 16,7 millones de colores, la mayor posibilidad de que una comparación de un píxel en un primer cuadro represente la misma ubicación física como la de un píxel en un segundo cuadro que tiene el mismo color o un color muy similar. Si un color no se encuentra en una imagen que está dentro de un rango de comparación de color, el método puede por defecto de una fórmula estandarizada reposicionar la imagen basado sobre información histórica.

El método también puede ser implementado en un sistema de computador e incorporado sobre un producto de programa de computador para uso con el sistema de computador en el cual el método se incorpora en un código legible por computador. Además, el método también puede ser incorporado en un sistema que incluye una interface de usuario, un procesador, y una memoria asociada. El procesador incluye un módulo de interfaz de usuario para

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recibir señales desde la interface de usuario. En tal una configuración, un usuario puede enviar señales al procesador a través de la interfaz de usuario indicando la secuencia de video a ser procesada, indicando un rango de comparación de color, valores de píxel seleccionado, seleccionar posiciones de alineación, por ejemplo. El procesador también puede incluir un módulo de ubicación para ubicar un píxel dentro de un segundo cuadro que tiene asociado un color que está dentro del rango de color del color asociado con la selección de píxel desde el primer cuadro de video. El procesador incluye además un módulo de reposicionamiento para leer la dirección del segundo cuadro de video de tal forma que el píxel ubicado en el segundo cuadro tiene una dirección que es igual a la dirección de la selección del píxel del primer cuadro de video y también incluye un módulo de almacenamiento para almacenar la lectura de la dirección del segundo cuadro de video.

Breve Descripción de los Dibujos

Las características de la invención serán más fácilmente entendibles mediante referencia a la siguiente

descripción detallada, tomada con referencia a los dibujos que las acompañan, en los cuales

La figura 1 es una imagen que tiene una resolución de 800 x 600 píxeles,

La figura 2 es un diagrama de flujo que muestra un método para estabilizar imagen a través de la comparación de color desarrollada en conjunto con un sistema de computador,

Las figuras 3A-C muestran píxeles que son reposicionados sobre una pantalla,

La figura 3A muestra un primer cuadro con un píxel seleccionado,

La figura 3B muestra un segundo cuadro con un píxel marcado que tiene un color dentro de una tolerancia de color del píxel seleccionado en la figura 3A,

La figura 3C muestra el segundo cuadro de la figura 3B superpuesto y realineado sobre el primer cuadro de la figura 3A,

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La figura 4 es un diagrama de flujo que muestra otra modalidad para la estabilización de imagen,

La figura 5 es un diagrama de flujo que muestra otra modalidad para estabilización de imagen utilizando comparación de color e interpolación,

La figura 6 muestra selección de píxeles en un cuadro de inicio y final de una secuencia de video,

La figura 7A muestra una secuencia de video anterior para estabilización de imagen en la cual todas las imágenes son alineadas,

La figura 7B muestra la secuencia de video de la figura 7A después de realineación, y

La figura 8 muestra una modalidad de la invención como un sistema

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27**Descripción Detallada de las Modalidades Específicas**

Como se usa en el siguiente texto, el término "secuencia de video" implica una representación digital de una secuencia de imágenes que pueden ser temporalmente exhibidas sobre un dispositivo de pantalla. Típicamente, una secuencia contiene una pluralidad de cuadros en donde cada cuadro representa una imagen separada. Los cuadros pueden ser subdivididos adicionalmente de tal forma que los cuadros puedan ser hechos de una serie de píxeles. Como se utiliza en la siguiente descripción el término "píxel" puede significar un punto sencillo de una imagen. El gran número de píxeles que son contenidos en una imagen, son la mayor resolución del video. La resolución de una imagen/cuadro está convencionalmente referenciada por la longitud y amplitud de las medidas del número de píxeles, por ejemplo, en una resolución de 800 x 600, existen 800 píxeles a lo largo de la imagen x 600 píxeles a lo largo del ancho de la imagen. Asociado con cada píxel está una dirección. Por ejemplo como muestra en la figura 1 una imagen que tiene una resolución de 800 x 600 se presenta y el píxel en la dirección (200, 300) se marca con una X en donde el origen se ubica en la esquina superior izquierda de la pantalla. Como se utiliza aquí

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un cuadro puede ser ya sea una imagen completa o una porción de una imagen, tal como un campo que incluye solo una mitad de una imagen completa

En una modalidad de la invención, un método se presenta para estabilizar imágenes de video de una secuencia de video digital en donde la secuencia de video digital incluye una pluralidad de imágenes digitales/cuadros. La estabilización se desarrolla a través de la comparación de color de un color de píxel seleccionado en un primer cuadro mediante la búsqueda de un píxel en un segundo cuadro que tiene un color que cae dentro de la tolerancia del color. El segundo cuadro es luego alineado con el primer cuadro de tal forma que el píxel en el segundo cuadro con la comparación del color tiene la misma dirección de píxel de tal forma que el píxel seleccionado del primer cuadro. El segundo cuadro es luego almacenado en la memoria. Esta metodología es especialmente útil ya que se incrementa la resolución y el número de colores posibles que pueden ser representados. Como el video se mueve a formatos HDTV que tienen 16,7 millones de colores posibles y más para un valor de color de píxel, los valores de color de píxel llegan a ser más únicos y así rastrear el color es más efectivo por medios de cases de

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imágenes y suministrar estabilización de imágenes y conteo para movimiento dentro de imágenes

El método para estabilización de imagen a través de comparación de color se desarrolla en conjunto con un sistema de computador en donde el sistema de computador incluye al menos una pantalla, un dispositivo de entrada, memoria asociada y un procesador. El método se explica en detalle más formal con referencia a la figura 2. Primero una secuencia digital se recibe mediante un procesador del sistema del computador de la ubicación de la memoria. 200 Una tolerancia de color es ya sea predeterminada y azezada por el procesador o el usuario se pregunta para la entrada de una tolerancia de color. 210 La tolerancia de color está en el rango dentro del cual la comparación del color considerada ocurrirá. Un primer cuadro de la secuencia de video es luego mostrado a un usuario. El usuario entonces selecciona un píxel dentro del primer cuadro. 220 Preferiblemente el píxel es de un color distinto o el píxel es parte de un objeto que se mueve dentro de la secuencia de video y aparece fluctuando dentro de la secuencia de video que se muestra. Después el píxel es seleccionado, el procesador identifica el color asociado con el píxel. 230 El procesador luego

recupera el segundo cuadro y desarrolla una búsqueda del segundo cuadro para identificar un píxel que tiene el mismo color de tal forma que el píxel seleccionado del primer cuadro dentro de la tolerancia de color 240 La comparación del color puede ser desarrollada tomando el color en conjunto para un píxel que incluye todos los componentes de color o pesando los componentes de color individuales Por ejemplo, si la secuencia de video está representada en un R, G, B, espacio de color, un case de color idéntico (por ejemplo uno que tiene una tolerancia de color de 0%) puede requerir que cada uno de los valores R, G, y B son idénticos La tolerancia de color puede ser la diferencia en conjunto en color como un porcentaje Por ejemplo, una tolerancia de color puede ser 005% en donde el espacio de color incluye 16 7 millones de colores o una tolerancia de color puede requerir que cada componente de color debe estar dentro de cierta tolerancia de dicho 10% de cada valor R, G, y B del píxel seleccionado Una vez un píxel dentro del segundo cuadro es identificado, la dirección del píxel desde el segundo cuadro es luego alineada con la dirección del píxel del píxel seleccionado del primer cuadro 250 Las figuras 3A, B y C muestran los píxeles que son reposicionados La figura 3A muestra un primer

cuadro con un píxel marcado con una X como puede ser mostrado en el dispositivo de exhibición. La figura 3B es un segundo cuadro en donde un píxel que casa con el píxel seleccionado del primer cuadro es identificado con una O. La figura 3C muestra que los píxeles desplegados del segundo cuadro están reposicionados, y así redirigidos. Después el segundo cuadro es reposicionado y así las direcciones de todos los píxeles del cuadro son cambiadas, el segundo cuadro realineado es almacenado a la memoria por el procesador 260. Este proceso puede ser continuado para cada cuadro de una secuencia de video. En tal una modalidad, el color del píxel seleccionado del primer cuadro puede ser buscado en cada cuadro subsiguiente. Se debe notar que algunos valores de píxel del segundo cuadro realineado no mostrarán un dispositivo de exhibición ya que las nuevas direcciones de estos píxeles caen fuera de las direcciones de exhibición. Adicionalmente, algunas direcciones de exhibición para el segundo cuadro realineado no tendrán valores de color para los píxeles. En una modalidad, estas direcciones de píxel son hechas negras. En otras modalidades, los valores por defecto de color pueden ser asignados de tal forma que los valores de las direcciones de píxel adyacentes.

La metodología puede ser definida además como se muestra en la figura 4. Como se expresó anteriormente, una secuencia de video es recibida por un procesador de una ubicación de memoria. Un primer cuadro es presentado a un usuario. El usuario define un área de búsqueda dentro de un cuadro de video etapa 401. Por ejemplo, el usuario puede utilizar un dispositivo de entrada tal como un ratón o un esfero de luz para indicar gráficamente el área de búsqueda. En una modalidad, el cuadro de video completo es el área de búsqueda. Definir un área de búsqueda que es menos que la imagen entera puede ser benéfico en imágenes en las cuales un usuario se interesa en un elemento particular de una imagen. Por ejemplo, si la secuencia de video es de un carro que está conduciendo lejos y el usuario está interesado en la placa del vehículo, el usuario puede seleccionar una subsección del cuadro del video. En el ejemplo, el usuario podría indicar que la placa o una porción del carro fue seleccionado como el conjunto de subimagen. La imagen desplegada después de realineación de los cuadros puede ser el cuadro de video completo o solo el subconjunto de cuadro seleccionado.

En una secuencia de video que se desea se haga en la cual el objeto que se mueve aún lo hace a través del cuadro completo, la selección de una subsección de la imagen, tal como aquella de la placa de un vehículo, debe ser hecha sobre una corta secuencia de cuadros. Por ejemplo, si la secuencia completa es de 120 campos de video (aproximadamente 2 seg), la secuencia puede ser subdividida de tal forma que solo unos pocos cuadros (por ejemplo 10 campos) son utilizados. El carro y la placa pueden ser designados como la subsección de la imagen para propósitos de comparación ya que la placa del carro no se moverá muchas ubicaciones de píxel sobre 10 campos. Mediante la selección de una subsección, esto mejora la disparidad de que los píxeles de color comparados actualmente representan el mismo punto físico.

El usuario también es preguntado por el sistema del computador para una tolerancia de color que como se explicó anteriormente está en un margen aceptable de error para comparar un color 402. El usuario también puede indicar un punto de alineación que es el punto sobre la salida de pantalla del dispositivo de exhibición al cual se alinea el píxel de quienes case mejor el color del rastreo de color 403. En una modalidad, el defecto es

el centro de la pantalla del dispositivo de exhibición aunque otras posiciones sobre la pantalla también pueden ser seleccionadas. El usuario también suministra el color a ser rastreado 404. Esto es hecho mediante la observación del primer cuadro de video y seleccionando un píxel utilizando el dispositivo de entrada de usuario.

Para cada cuadro de video 420, los valores de color de cada píxel de cada área son comparados 430 con los valores de color de rastreo de color seleccionado del primer cuadro de video. Si los valores de color para el espacio de color (por ejemplo R, G, B) de un píxel están dentro de la tolerancia de entrada 440, el píxel será considerado como un case. El píxel en el que la suma de los valores absolutos de las diferencias entre los valores de color rojo, verde y azul de aquellos del color rastreado es más pequeño y es identificado como el punto de case del color. Si el punto de case de color está dentro de la tolerancia entrada para cada uno de los valores de espacio de color asociado con el píxel seleccionado, el cuadro es cambiado 450 de tal forma que el píxel identificado como el mejor case de color es colocado en el punto de alineación de la pantalla y el cuadro cambiado es luego borrado de la memoria. Si no se

encuentra ningún caso de color, la imagen es cambiada 460 de acuerdo a una fórmula predeterminada. Por ejemplo, los cambios pueden ser determinados mediante análisis de cambios pasados y promediar los cambios para determinar como alinear el cuadro de datos de video. Por ejemplo, la imagen puede ser cambiada en la dirección X mediante un promedio pesado de distancias cambiadas previamente en la dirección X. Similarmente, el cambio en la dirección Y puede ser un promedio pesado de distancias cambiadas previamente en la dirección Y.

En otras modalidades, la imagen puede ser cambiada de acuerdo con la siguiente fórmula

$$\begin{aligned} xdiff &= ((sx1-sx2) + (sx2-sx3) + (sx3-sx4))/3 * (sd), \text{ y} \\ ydiff &= ((sy1-sy2) + (sy2-sy3) + (sy3-sy4))/3 * (sd), \text{ en} \\ &\text{donde} \end{aligned}$$

$sx1$ = cambio horizontal previo,
 $sy1$ = cambio vertical previo,
 $sx2$ = antes de cambio horizontal $sx1$,
 $sy2$ = antes de cambio vertical $sy1$,
 $sx3$ = antes de cambio horizontal $sx2$,
 $sy3$ = antes de cambio vertical $sy2$,

sx_4 = antes de cambio horizontal sx_3 , sy_4 = antes de cambio vertical sy_3 , y

En donde sd es un factor retardante

El cuadro es luego cambiado 460 mediante una cantidad dada por las siguientes ecuaciones

Cambio horizontal = $sx_1 + xdiff$, y

Cambio vertical = $sy_1 + ydiff$

El cuadro cambiado es luego escrito fuera 465 del almacenamiento de video de imagen

Si el flujo de entrada contiene 470 más cuadros de video, el siguiente cuadro es procesado 420 Una vez todos los cuadros en el flujo de entrada son procesados, la operación de rastreo de color se completa

Una vez todos los cuadros de video son reposicionados utilizando el rastreo de color, la secuencia de cuadros puede ser temporalmente desplegada sobre un dispositivo de exhibición y así el movimiento de la cámara u objeto



se reducirá Otras muestras de los cuadros de video en una presentación temporal, los cuadros de video pueden estar promediados linealmente con el fin de suministrar una imagen de alta definición o porción de una imagen Por ejemplo, una placa de un vehículo que se está moviendo y que es ilegible debido a la fluctuación puede ser legible una vez la imagen se estabilice Aún si esto no es, todos los cuadros pueden ser promediados linealmente juntos para producir una imagen de alta resolución que pueda suministrar una imagen mejorada en donde la placa es legible Mediante alinear precisamente las imágenes a una resolución de subpixel, y promediando las imágenes juntas, una imagen de alta resolución puede ser generada Esto se debe al hecho de que varias imágenes de un objeto son capturadas, cada imagen presenta una parte ligeramente diferente del objeto en cada cuadro En general un mínimo de 3 a 5 cuadros son necesarios para mejorar la imagen

En otra modalidad de la invención, se emplea la interpolación en conjunto con comparación de color como se explicó en la figura 5 En tal una modalidad, una secuencia de video se suministra en un sistema de computador 500 Un usuario del sistema se le permite ver

la secuencia de video sobre un dispositivo de selección y seleccionar un cuadro inicial y un cuadro final 501 Un píxel se selecciona en ambos el cuadro inicial y el cuadro final 502 Preferiblemente el píxel en el cuadro inicial y el cuadro final es un píxel que es parte de un objeto para el cual la estabilización de movimiento se desea Por ejemplo, un píxel puede ser seleccionado de una imagen de video de un carro que está en movimiento Un píxel en el cuadro final puede ser seleccionado que es parte del carro como se muestra en la figura 6 El sistema luego interpola entre el valor del color para el píxel seleccionado en el cuadro inicial y el valor del color del píxel en el cuadro final 503 El método de interpolación puede ser cualquier método de interpolación conocido por un experto en la técnica común, tal como interpolación lineal, bi-lineal, y bi-cúbico El método de interpolación suministra valores de interpolación para cada cuadro entre el cuadro inicial y el cuadro final Por ejemplo, si existen cuatro cuadros, un valor de color interpolado puede ser determinado para el segundo y tercer cuadros Una vez un valor de color se determine para cada cuadro entre los cuadros hínceles y finales, el procesador comienza a buscar para tal valor de color en cada cuadro respectivo 504 El procesador puede usar un

rango de comparación de color/tolerancia de color para ubicar un píxel que case con el color. En una modalidad, el procesador busca por el primer píxel que tiene el color exacto y no utiliza la tolerancia de color. En otra modalidad, cada píxel que está dentro de la tolerancia de color se guarda a la memoria y una medida de diferencia como se describió anteriormente se determina hasta que el píxel con el color más cercano que case se determina 505. Si ningún píxel casa, el procesador emplea una fórmula tal como la que se suministró anteriormente, u otra fórmula que se basa sobre análisis trend u otra propiedad de secuencia de video 506. Cuando un píxel ha sido seleccionado para cada cuadro, los cuadros después del cuadro inicial que incluyen el cuadro final son realineados 507. La realineación requiere que las direcciones asociadas de cada píxel sean redeterminadas, tal que cuando la secuencia de video se muestre sobre un dispositivo de exhibición la ubicación del píxel seleccionado en el primer cuadro corresponde con los píxeles en los cuadros subsiguientes que casen con el valor del color. Por ejemplo, como se muestra en la figura 7A un píxel es seleccionado en el Cuadro inicial en donde los cuadros restantes son alineados como pudieran normalmente ser desplegados. La figura 7B muestra los

cuadros de video realineados de tal forma que los píxeles de case de color de todos los cuadros subsiguientes al cuadro inicial son posicionados en el mismo punto sobre una pantalla de exhibición como el píxel seleccionado del cuadro inicial. Este proceso puede ser repetido si menos de la secuencia de video completa se incluye entre el cuadro inicial y el cuadro final.

El método para la estabilización de imagen puede ser incorporado como un sistema como se muestra en la figura 8. El sistema 800 incluye un dispositivo de entrada 801 tal como un ratón, trackball, teclado, y pantalla de video 802 y un procesador 803 que tienen memoria asociada 804. El procesador incluye varios módulos. El primer módulo es un módulo de interfaz de usuario 803A que opera para recibir señales de un dispositivo de entrada de usuario. El usuario puede entrar una solicitud para desarrollar una estabilización de imagen sobre una secuencia de imagen de video seleccionada. El usuario puede ver el primer cuadro de la secuencia de video y seleccionar un píxel dentro de la secuencia en donde el módulo de interface de usuario 803A recibe esta información y envía la información a un módulo de ubicación 803B que identifica el color del píxel.

seleccionado y accesa un segundo cuadro de los datos de video. El módulo de ubicación 803B ubica los valores de datos del segundo cuadro con el fin de identificar el píxel que es el case de color más cercano al píxel seleccionado en el primer cuadro. Si no se encuentra ningún píxel que esté dentro del rango del color, entonces el módulo de ubicación 803B haya por defecto de una fórmula predeterminada tal como la que se describió anteriormente. Cuando un píxel ha sido identificado, la ubicación del píxel se presenta a un módulo de reposicionamiento 803C que redirecciona todos los píxeles dentro del segundo cuadro de tal forma que el píxel ubicado en el segundo cuadro tiene una nueva dirección que es la misma dirección mostrada como el píxel seleccionado en el primer cuadro. La información de dirección junto con los valores de color de píxel correspondientes son almacenados a la memoria mediante un módulo de almacenamiento 803D.

Se debe notar que los diagramas de flujo son utilizados aquí para demostrar varios aspectos de la invención, y no deben ser constituidos como limitante de la presente invención para cualquier flujo lógico particular o implementación lógica. El soporte lógico descrito puede

ser particionado en diferentes bloques lógicos (por ejemplo, programas, módulos, funciones, o subrutinas) sin cambiar los resultados en su totalidad o de otra manera salirse del verdadero alcance de esta invención

La presente invención también puede ser incorporada en varias formas diferentes, que incluyen, pero no en forma limitada a, programa lógico de computador para uso con un procesador (por ejemplo, un microprocesador, microcontrolador, procesador de señal digital, o computador de propósito general), soporte lógico programable para uso con un dispositivo lógico programable (por ejemplo, un conjunto lógico programable en campo (FPGA) u otro PLD), componentes discretos, circuitos integrados (por ejemplo, un Circuito Integrado de Aplicación Específica (ASIC)), u cualquier otro medio que incluya una combinación de estos

El soporte lógico de programa de computador que implementa todas o parte de la funcionalidad previamente descrita aquí puede ser incorporada en varias formas, que incluyen, pero no limitan en ninguna forma a, una forma de código de fuente, una forma ejecutable por computador, y varias formas intermedias (por ejemplo, formas

generadas por un ensamblador, compilador, enlazador, o ubicador) El código fuente puede incluir una serie de instrucciones de programa de computador implementadas en cualquiera de varios programas de lenguaje (por ejemplo, un código objeto, un lenguaje de ensamble, o un lenguaje de alto nivel tal como Fortran, C, C++, JAVA, o HTML) para uso con varios sistemas operativos o ambientes operativos El código fuente puede estar en una forma ejecutable por computador (por ejemplo, vía un intérprete), o el código fuente puede ser convertido (por ejemplo, vía un traductor, ensamblador, o compilador) en una forma ejecutable por computador

El programa de computador se puede fijar en cualquier forma (por ejemplo, en forma de código de fuente, en forma ejecutable por computador, o en forma intermedia) sea permanentemente o transitoriamente en un medio de almacenamiento tangible, tal como un dispositivo de memoria semiconductor (por ejemplo, una RAM, ROM, PROM, EEPROM, o RAM programable flash), un dispositivo de memoria magnético (por ejemplo, un diskette o disco fijo), un dispositivo de memoria óptico (por ejemplo, un CD-ROM, una tarjeta PC (por ejemplo tarjeta PCMCIA), u otro dispositivo de memoria El programa de computador

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puede ser fijado en cualquier forma en una señal que es transmisible a un computador utilizando cualquiera de varias tecnologías de comunicación, que incluyen, pero en ninguna forma limitado a, tecnologías análogas, tecnologías digitales, tecnologías ópticas inalámbricas, tecnologías de red, y tecnologías de trabajo en Internet. El programa de computador puede ser distribuido en cualquier forma como medio de almacenamiento removible con documentación acompañante impresa o electrónica (por ejemplo, soporte lógico comprimido o una cinta magnética), recargada con un sistema de computador (por ejemplo sobre un sistema ROM o fijado en el disco), o distribuido de un servidor o boletín electrónico sobre sistema de comunicación (por ejemplo el Internet o el World Wide Web).

El soporte físico (que incluye el soporte lógico programable para uso con un dispositivo lógico programable) que implementa todas o parte de la funcionalidad previamente descrita aquí puede ser diseñado utilizando los métodos manuales tradicionales, o puede ser diseñado, capturado, simulado o documentado electrónicamente utilizando varias herramientas, tales como diseño asistido por computador (CAD), un lenguaje de

descripción de soporte físico (por ejemplo, VHDL o AHDL),
o un PLD lenguaje de programación (por ejemplo, PALASM,
ABEL, o CUPL)

La presente invención puede ser incorporada en otras
formas específicas sin salirse del verdadero alcance de
la invención Las modalidades descritas son consideradas
en todos los aspectos solo como ilustrativas y no
restrictivas

REIVINDICACIONES

1 Un método para estabilizar imágenes de una primera imagen digital/que tiene una pluralidad de píxeles/ y al menos una segunda imagen/que tiene una pluralidad de píxeles/en donde cada píxel tiene una dirección asociada para mostrar y es representativa de un color, el método comprende

Suministrar un rango de case de color,

Seleccionar un píxel dentro de la primera imagen digital,

Identificar el color asociado con el píxel seleccionado en la primera imagen digital,

Ubicar un píxel en la segunda imagen que está dentro del rango de case del color asociado con el píxel de la primera imagen digital,

Reposicionar la segunda imagen de tal forma que la dirección del píxel en la segunda imagen digital

se posicione en la dirección del píxel seleccionado en la primera imagen digital, y

Almacenar la segunda imagen digital reposicionada a la memoria

2 El método de acuerdo con la reivindicación 1 comprende además seleccionar un área de imagen para ser utilizada para ubicar un píxel en la segunda imagen

3 El método de acuerdo con la reivindicación 1, comprende además suministrar un punto de alineación para alinear la primer imagen digital y la segunda imagen digital reposicionada de tal forma que el píxel del primer cuadro se alinee con el punto de alineación y el píxel en la segunda imagen digital se alinee con el punto de alineación cuando se despliegue sobre un dispositivo de exhibición

4 El método de acuerdo con la reivindicación 1, que comprende además desplegar la primera y segunda imagen digital reposicionada secuencialmente sobre un dispositivo de exhibición

5 Un método para estabilización de imagen de una secuencia digital de imágenes en donde cada imagen tiene una pluralidad de píxeles y en donde cada píxel tiene asociada una dirección para exhibir y es representativa de un color, el método comprende

Seleccionar una imagen digital inicial y una imagen digital final de secuencia de creación de un subconjunto de secuencia,

Seleccionar un píxel en la imagen digital inicial y un píxel en la imagen digital final,

Interpolar linealmente entre el color del píxel en la imagen digital inicial y el color del píxel en la imagen digital final de tal forma que el color interpolado se determine para cada imagen entre la imagen digital inicial y la imagen digital final,

Para cada color interpolado asociado con una imagen, buscar, dentro tal imagen, para un píxel que

tiene un color interpolado dentro de un rango predeterminado de colores,

Reposicionar cada imagen entre la imagen digital inicial y la imagen digital final, de tal forma que la dirección del píxel que tiene el color interpolado entre una imagen se posiciona a la dirección del píxel seleccionado en la imagen inicial

6 El método de acuerdo con la reivindicación 5 que comprende además desplegar al menos el subconjunto de secuencias sobre una pantalla

7 El método de acuerdo con la reivindicación 5 que comprende además

Seleccionar un área de imagen a ser utilizada para ubicar un píxel en la segunda imagen

8 El método de acuerdo con la reivindicación 5, que comprende además

100

Suministrar un punto de alineación para alinear la primera imagen digital y la segunda imagen digital reposicionada de tal forma que el píxel del primer cuadro se alinee con el punto de alineación y el píxel en la segunda imagen digital se alinee con el punto de alineación cuando se despliegue sobre un dispositivo de exhibición

9 El método de acuerdo con la reivindicación 5, en donde el subconjunto de secuencias incluye todas las imágenes dentro de la secuencia

10 El método de acuerdo con la reivindicación 1, en donde el rango de case de color requiere el case de color idéntico

11 El método de acuerdo con la reivindicación 5, en donde el rango redeterminado requiere un case de color idéntico

12 El método de acuerdo con la reivindicación 1, en donde un espacio de color tiene millones de colores se utiliza para representar los colores de píxel

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13 El método de acuerdo con la reivindicación 5, en donde los colores de píxel son representados en un espacio de color que tiene millones de colores

14 El método de acuerdo con la reivindicación 1, en donde si un píxel no se localiza dentro del rango de case de color, aplicar una fórmula predetermina para reposicionar los píxeles del segundo cuadro

15 El método de acuerdo con la reivindicación 5, en donde si un píxel no es ubicado dentro del rango de case de color, aplicar una fórmula predeterminada para reposicionar los píxeles del segundo cuadro

16 El método de acuerdo con la reivindicación 1, que comprende además

Recibir una señal que contiene información representativa de un rango de case de color

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17 El método de acuerdo con la reivindicación 5, que comprende además,

Recibir una señal que contiene información representativa de un rango de case de color

18 Un método para estabilizar imagen de una secuencia de imágenes de video digital desplegadas temporalmente, en donde cada imagen contiene un número de píxeles y cada píxel tiene una posición de exhibición asociada, el método comprende

Recibir una señal que contiene información representativa de un color asociado con un píxel contenido dentro de una primera imagen de la secuencia de imágenes de video digital,

Identificar un píxel dentro de una segunda imagen que tiene un valor de color dentro de un rango de umbral del color contenido dentro de la primer imagen, en donde el umbral puede ser cualquier valor incluyendo cero, y

Reposicionar la segunda imagen de tal forma que el píxel dentro de la segunda imagen tiene un valor de color dentro del rango de umbral que reside en la misma posición como el píxel de la primera imagen cuando se despliega temporalmente

19 El método de acuerdo con la reivindicación 18, que comprende además

Recibir una señal que contiene información representativa de un rango de case de color

20 Un método para estabilización de imagen de una secuencia de imágenes de video digital desplegadas temporalmente, en donde cada imagen contiene un número de píxeles y cada píxel tiene una posición desplegada asociada, el método comprende

Recibir una señal que contiene información representativa de un color asociado con un píxel contenido dentro de una primera imagen de la secuencia de imágenes de video digital,

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Recibir una señal representativa de un color contenido en una tercera imagen digital,

Interpolar entre el color de la primera imagen de video digital y el color en la tercera imagen de video digital para determinar un color buscable en una segunda imagen de video digital,

Identificar un píxel dentro de la segunda imagen de video digital que tiene una distancia de color dentro de un rango de umbral del color buscable, en donde el umbral puede ser cualquier valor incluyendo cero, y

Reposicionar la segunda imagen de tal forma que el píxel dentro de la segunda imagen tiene una distancia de color entre el rango de umbral que reside en la misma posición como el píxel de la primera imagen cuando se despliega sobre el dispositivo de exhibición

21 Un sistema para estabilización de imagen de una secuencia de video que tiene una pluralidad de cuadros de video, el sistema comprende

105

Una interface de usuario, y

Un procesador,

En donde el procesador incluye un módulo de interfaz de usuario para recibir señales de la interfaz de usuario,

En donde las señales incluyen una señal representativa de una selección de píxel en un primer cuadro de video,

El procesador también incluye un módulo de ubicación para ubicar un píxel dentro de un segundo cuadro que tiene un color asociado que está dentro del rango de color de un color asociado con la selección de píxel del primer cuadro de video,

Un módulo de reposicionamiento para redireccionar el segundo cuadro de video de tal forma que el píxel ubicado del segundo cuadro tiene una dirección que es la misma dirección que la selección del píxel del primer cuadro de video, y

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Un módulo de almacenamiento para almacenar un segundo cuadro de video redireccionado

22 El sistema de acuerdo a la reivindicación 21, que comprende además Memoria

23 Un producto de programa de computador que tiene un programa de computador en este que contiene códigos de computador para estabilización de imagen de una primera imagen digital que tiene una pluralidad de píxeles y al menos una segunda imagen que tiene una pluralidad de píxeles en donde cada píxel tiene una dirección asociada para exhibir y es representativa de un color, el código de computador comprende

Código de computador para suministrar un rango de case de color,

Código de computador para seleccionar un píxel dentro de la primera imagen digital,

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Código de computador para identificar el color asociado con el píxel seleccionado en la primera imagen digital,

Código de computador para localizar un píxel en la segunda imagen que está dentro del rango de case de color del color asociado con el píxel de la primera imagen digital,

Código de computador para reposicionamiento de la segunda imagen de tal forma que la dirección del píxel en la segunda imagen digital se posiciona en la dirección del píxel seleccionado en la primera imagen digital, y

Código de computador para almacenar la segunda imagen digital reposicionada a la memoria

24 El producto de programa de computador de acuerdo a la reivindicación 23 comprende además

Código de computador para permitir al usuario la selección de un área de imagen a ser utilizada para localizar un píxel en la segunda imagen

108

25 El producto de programa de computador de acuerdo a la reivindicación 23, comprende además

Código de computador para permitir a un usuario suministrar un punto de alineación para alinear la primera imagen digital y la segunda imagen digital reposicionada de tal forma que el píxel del primer cuadro se alinee con el punto de alineación y el píxel en el segundo cuadro en la segunda imagen digital se alinee con el punto de alineación cuando se despliegue sobre el dispositivo de exhibición

26 El producto de programa de computador de acuerdo con la reivindicación 23, comprende además código de computador para desplegar la primera y la segunda imagen digital reposicionada secuencialmente sobre un dispositivo de exhibición

27 Un producto de programa de computador para uso con un computador que tiene un código legible por computador en este para estabilización de imagen de una secuencia digital de imágenes, en donde cada imagen tiene una pluralidad de píxeles en donde cada

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píxel tiene una dirección asociada para exhibir y es representativa de un color, el código legible por computador comprende

Código de computador para permitir al usuario la selección de una imagen digital inicial y una imagen digital final de una secuencia de creación de un subconjunto de secuencia,

Código de computador para permitir al usuario la selección de un píxel en la imagen digital inicial y un píxel en la imagen digital final,

Código de computador para interpolar entre el color del píxel en la imagen digital inicial y el color del píxel en la imagen digital final de tal forma que un color interpolado se determine para cada imagen entre la imagen digital inicial y la imagen digital final,

Código de computador para buscar, dentro de tal imagen, para un píxel que tiene el color interpolado dentro del rango predeterminado de colores para cada color interpolado asociado con una imagen,

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Código de computador para reposicionar cada imagen entre la imagen digital inicial y la imagen digital final, de tal forma que la dirección del píxel tiene el color interpolado dentro de una imagen que se posiciona a la dirección del píxel seleccionado en la imagen inicial

28 El producto de programa de computador de acuerdo a la reivindicación 27 comprende además

Código de computador para desplegar al menos el subconjunto de secuencia sobre una pantalla

29 El producto de programa de computador de acuerdo a la reivindicación 27 que comprende además

Código de computador para permitir a un usuario seleccionar un área de imagen a ser utilizada para ubicar un píxel en la segunda imagen

30 El producto de programa de computador de acuerdo a la reivindicación 27 que comprende además

Código de computador para permitir al usuario la seleccionar de un punto de alineación para alinear la primer imagen digital y la segunda imagen digital reposicionada de tal forma que el píxel de la primer cuadro se alinee con el punto de alineación y el píxel en la segunda imagen digital se alinee con el punto de alineación cuando se despliegue sobre un dispositivo de exhibición

31 El producto de programa de computador de acuerdo a la reivindicación 27, en donde el subconjunto de secuencia incluye todas las imágenes dentro de la secuencia

32 El producto de programa de computador de acuerdo a la reivindicación 27, en donde el rango de case de color requiere un case de color idéntico

33 El método de acuerdo a la reivindicación 23, en donde el rango predeterminado requiere un case de color idéntico

34 El producto de programa de computador de acuerdo a la reivindicación 27, en donde un espacio

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A

de color tiene millones de colores se utiliza para representar los colores de píxel

35 El producto de programa de computador de acuerdo a la reivindicación 23, en donde los colores de píxel son representados en un espacio de color que tiene millones de colores

36 El producto de programa de computador de acuerdo a la reivindicación 27, comprende además código de computador para aplicar una fórmula predeterminada para reposicionar los píxeles del segundo cuadro si un píxel no se ubica dentro del rango de case de color

37 El producto de programa de computador de acuerdo a la reivindicación 23, que comprende además código de computador para aplicar una fórmula predeterminada para reposicionar los píxeles del segundo cuadro si un píxel no se ubica dentro del rango de case de color

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38 El producto de programa de computador de acuerdo a la reivindicación 23, que comprende además

Código de computador para recibir una señal que contiene información representativa de un rango de case de color

39 El producto de programa de computador de acuerdo a la reivindicación 27, que comprende además

Código de computador para recibir una señal que contiene información representativa de un rango de case de color

40 Un producto de programa de computador para uso con un computador en donde el producto de programa de computador tiene código legible por computador en este para estabilización de imagen de una secuencia de imágenes de video digital desplegadas temporalmente, en donde cada imagen contiene un número de píxeles y cada píxel tiene una

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posición desplegada asociada, el código de computador comprende

Código de computador para recibir una señal que contiene información representativa de un color asociado con un píxel contenido dentro de una primer imagen de una secuencia de imágenes de video digital,

Código de computador para identificar un píxel dentro de una segunda imagen que tiene un valor de color dentro un rango de umbral del color contenido dentro de la primer imagen, en donde el umbral puede ser cualquier valor incluyendo cero, y

Código de computador para reposicionamiento de la segunda imagen de tal forma que el píxel dentro de la segunda imagen tiene un valor de color dentro del rango de umbral que reside en la misma posición como el píxel de la primera imagen

41 El producto de programa de computador de acuerdo a la reivindicación 40, comprende además

Código de computador para recibir una señal que contiene información representativa de un rango de case de color

42 Un producto de programa de computador para uso con un computador, el producto de programa de computador tiene un código legible por computador en este para estabilización de imagen de una secuencia de imágenes de video digital desplegadas temporalmente, en donde cada imagen contiene un número de píxeles y cada píxel tiene una posición de exhibición asociada, el código de computador comprende

Código de computador para recibir una señal que contiene información representativa ~~de~~ color asociado con un píxel contenido dentro de una primera imagen de la secuencia de imágenes de video digital,

Código de computador para recibir una señal representativa de un color contenido en una tercera imagen digital,

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Código de computador para interpolar entre el color de la primera imagen de video digital y el color en la tercera imagen de video digital para determinar el color buscable en una segunda imagen de video digital,

Código de computador para identificar un píxel dentro de una segunda imagen de video digital que tiene una distancia de color dentro de un rango de umbral de un color buscable, en donde el umbral puede ser cualquier valor incluyendo cero, y

Código de computador para reposicionar la segunda imagen de tal forma que el píxel dentro de la segunda imagen tiene un valor de color dentro del rango del umbral que reside en la misma posición como el píxel de la primera imagen cuando se desplegó sobre un dispositivo de exhibición

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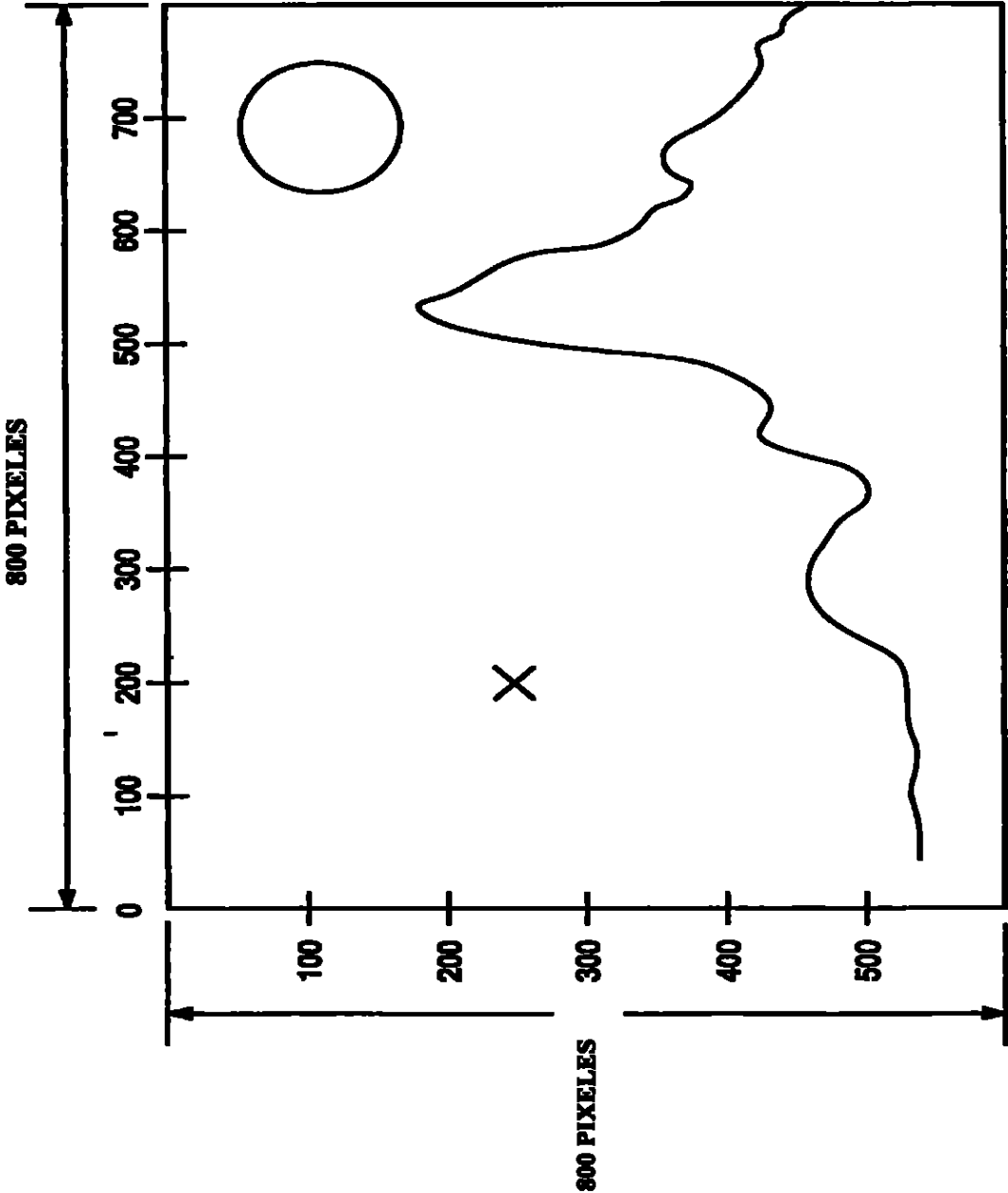


FIG. 1

JB

2/8

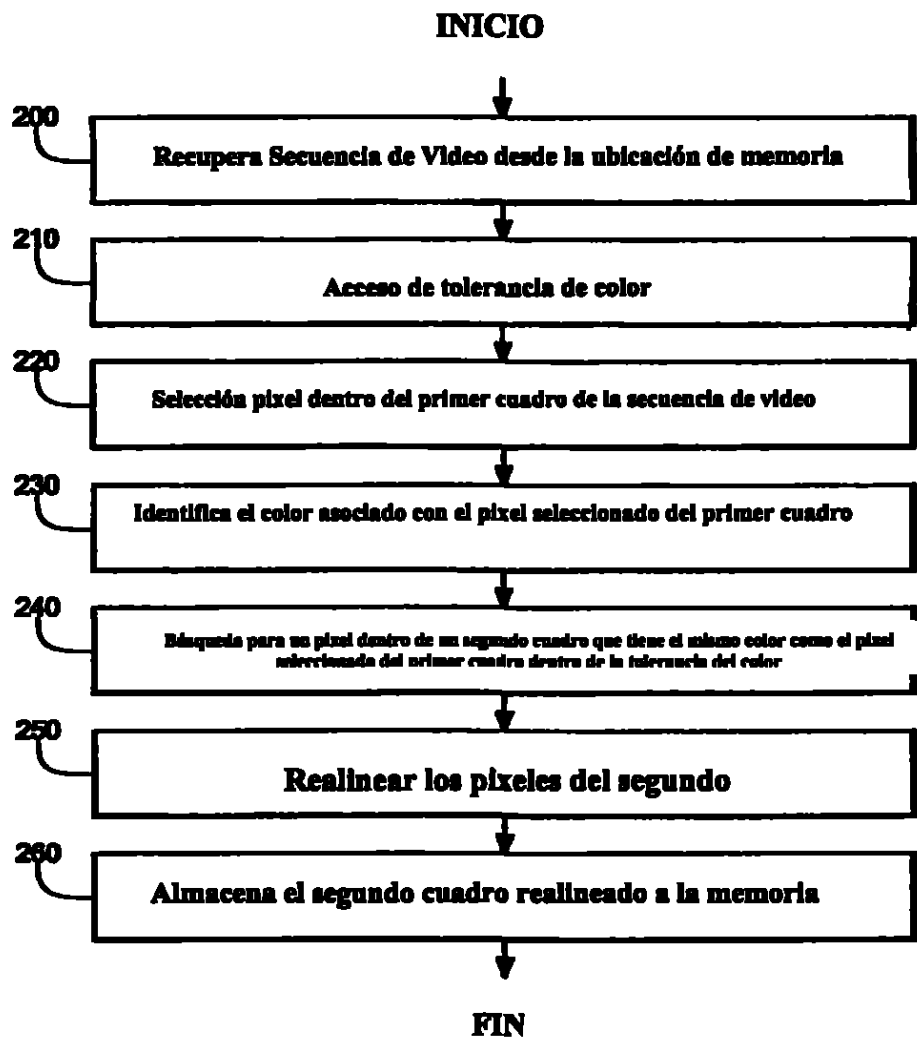


FIG. 2

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PRIMER CUADRO

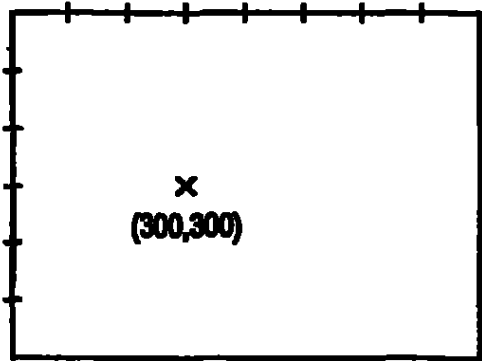


FIG. 3A

SEGUNDO CUADRO

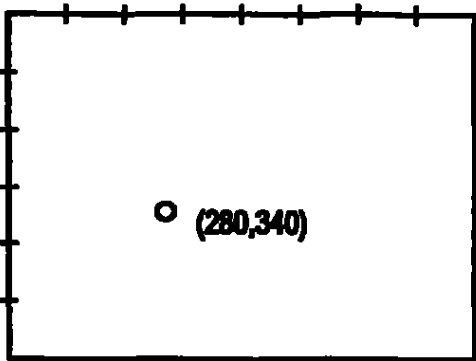
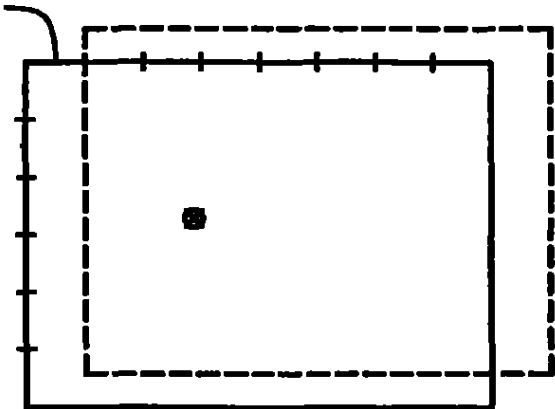


FIG. 3B

PRIMER CUADRO



SEGUNDO CUADRO
REALINEADO
CON NUEVAS
DIRECCIONES

FIG. 3C

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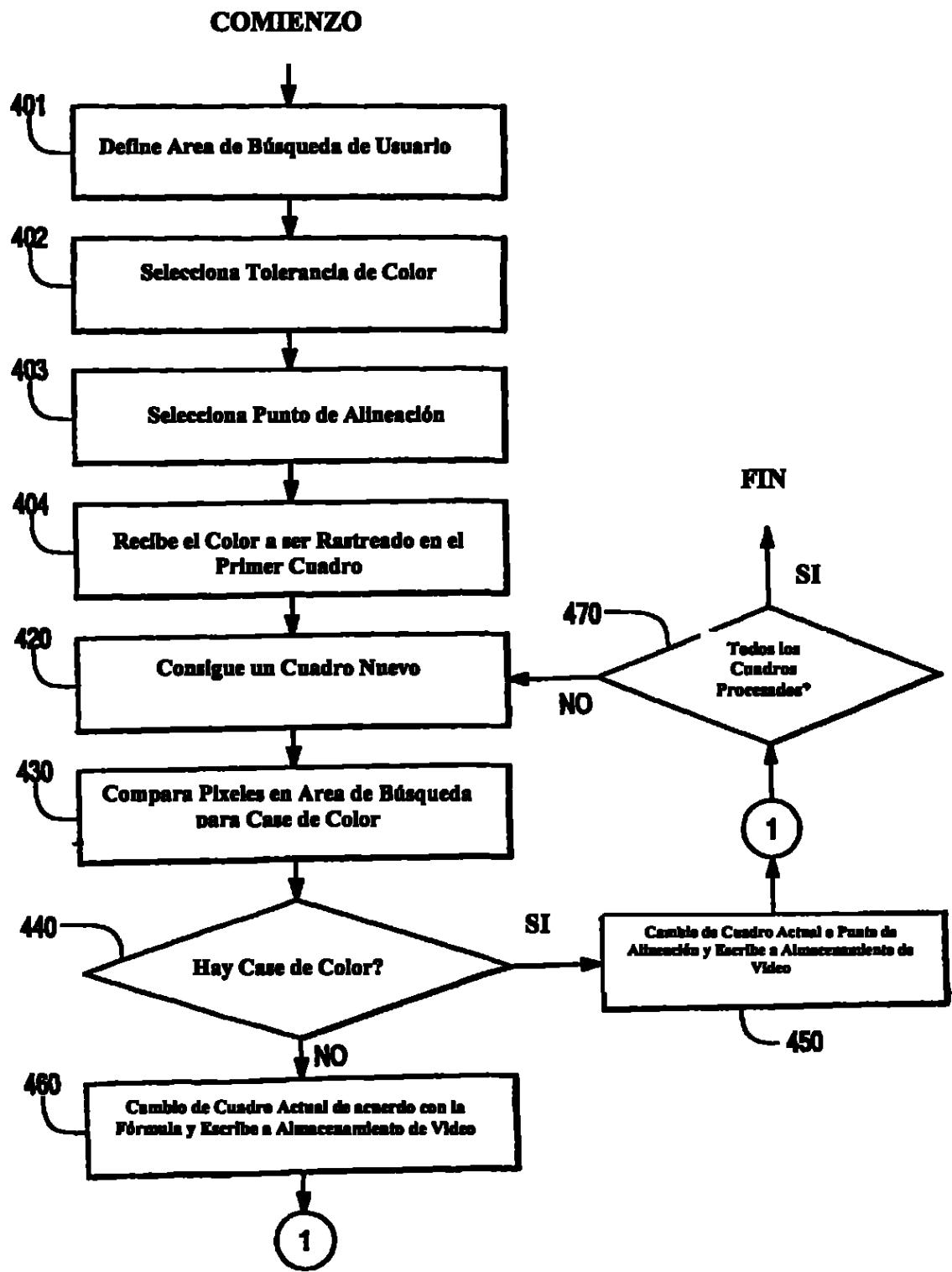


FIG. 4

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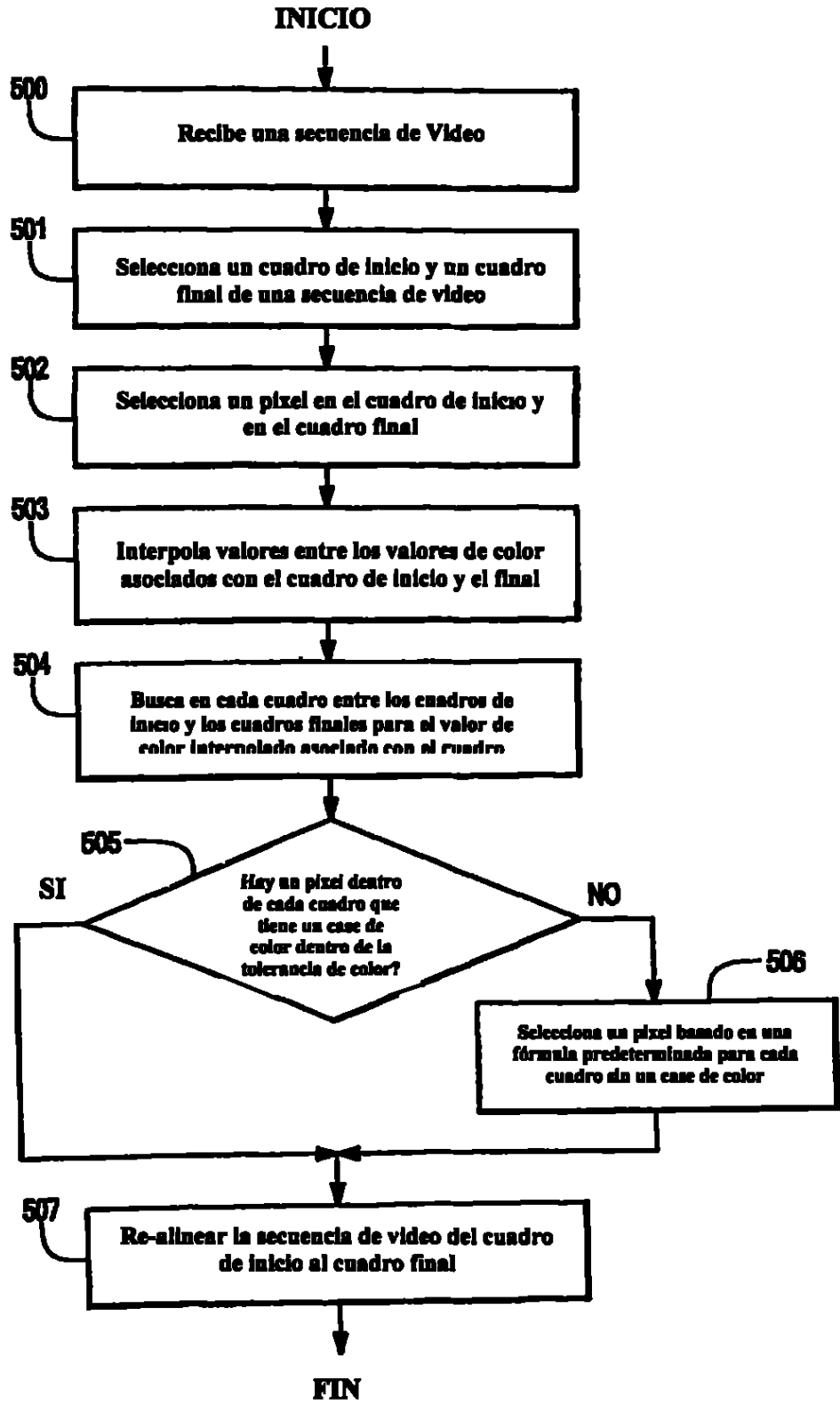


FIG. 5

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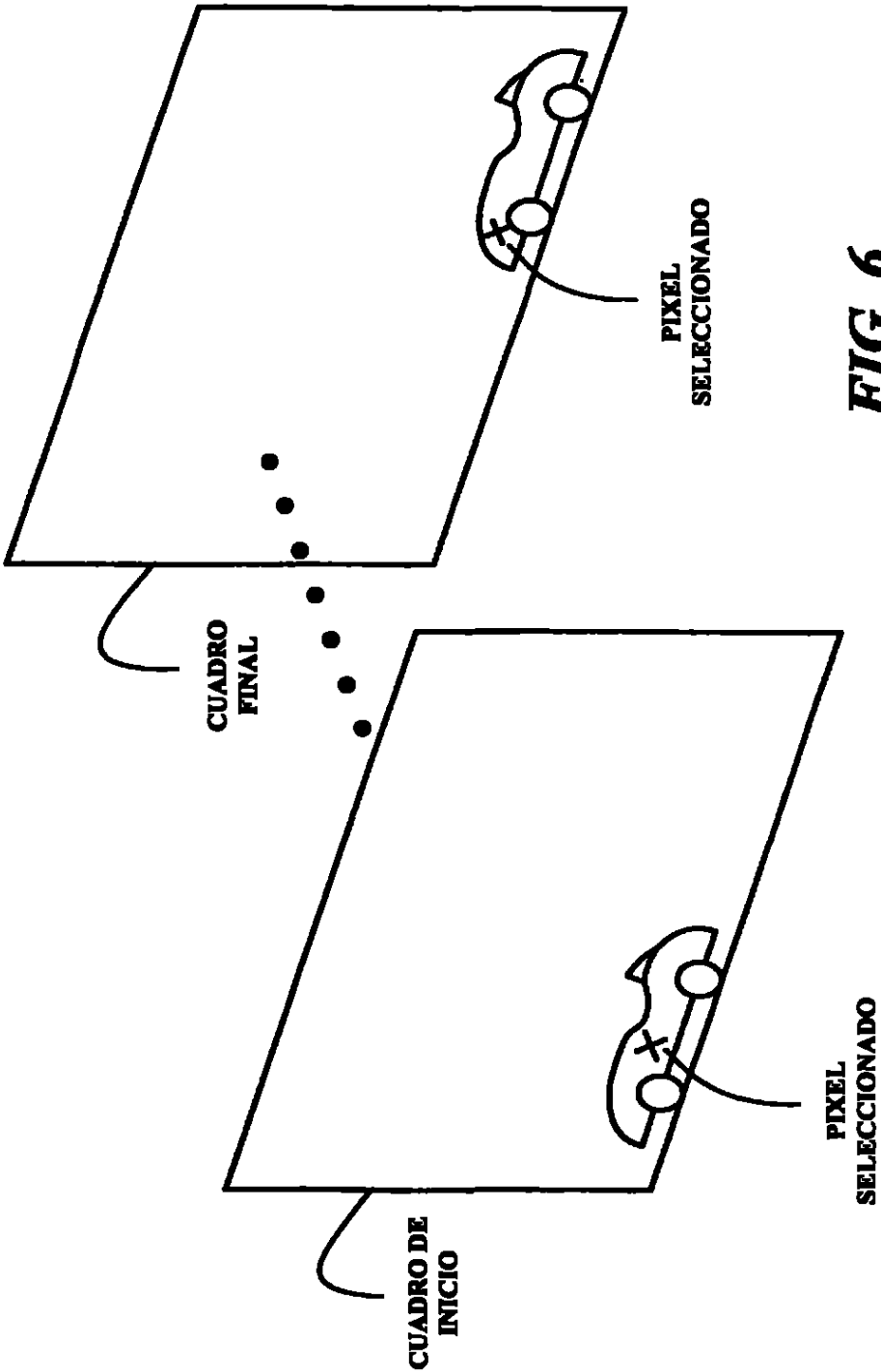


FIG. 6

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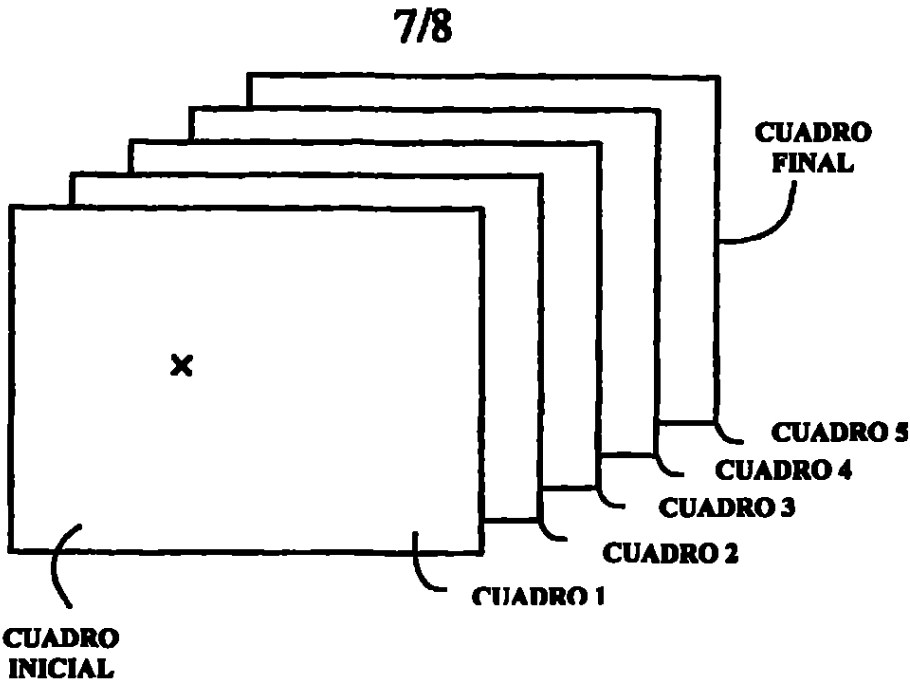


FIG. 7A

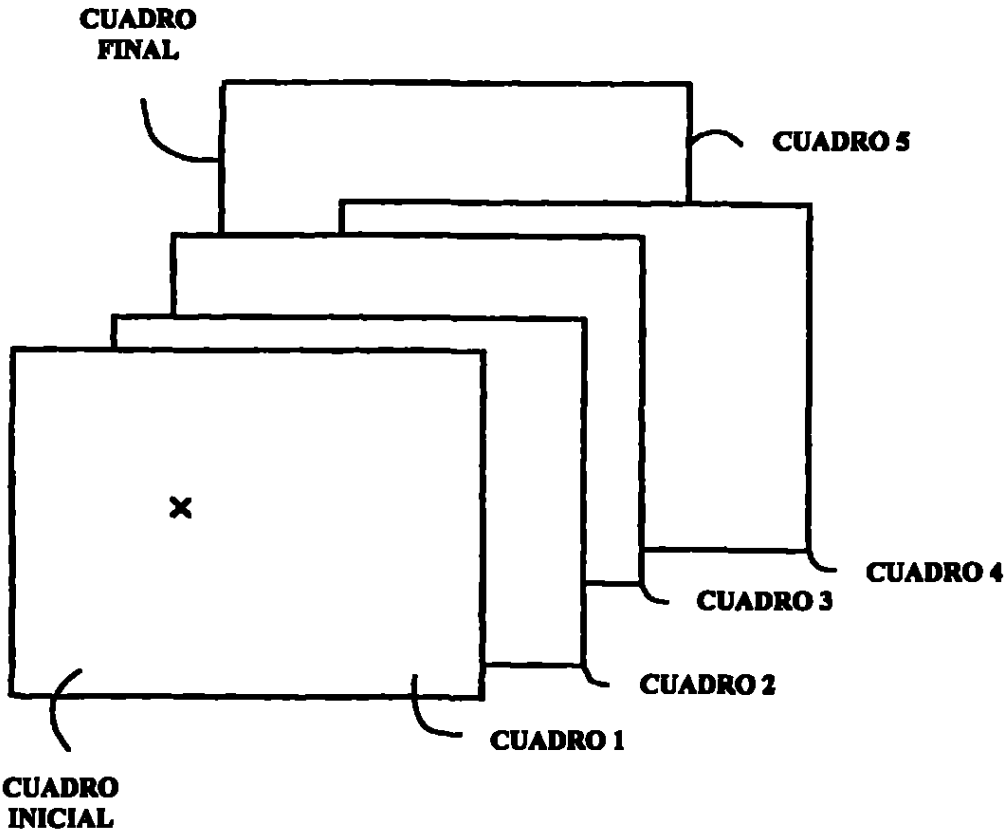
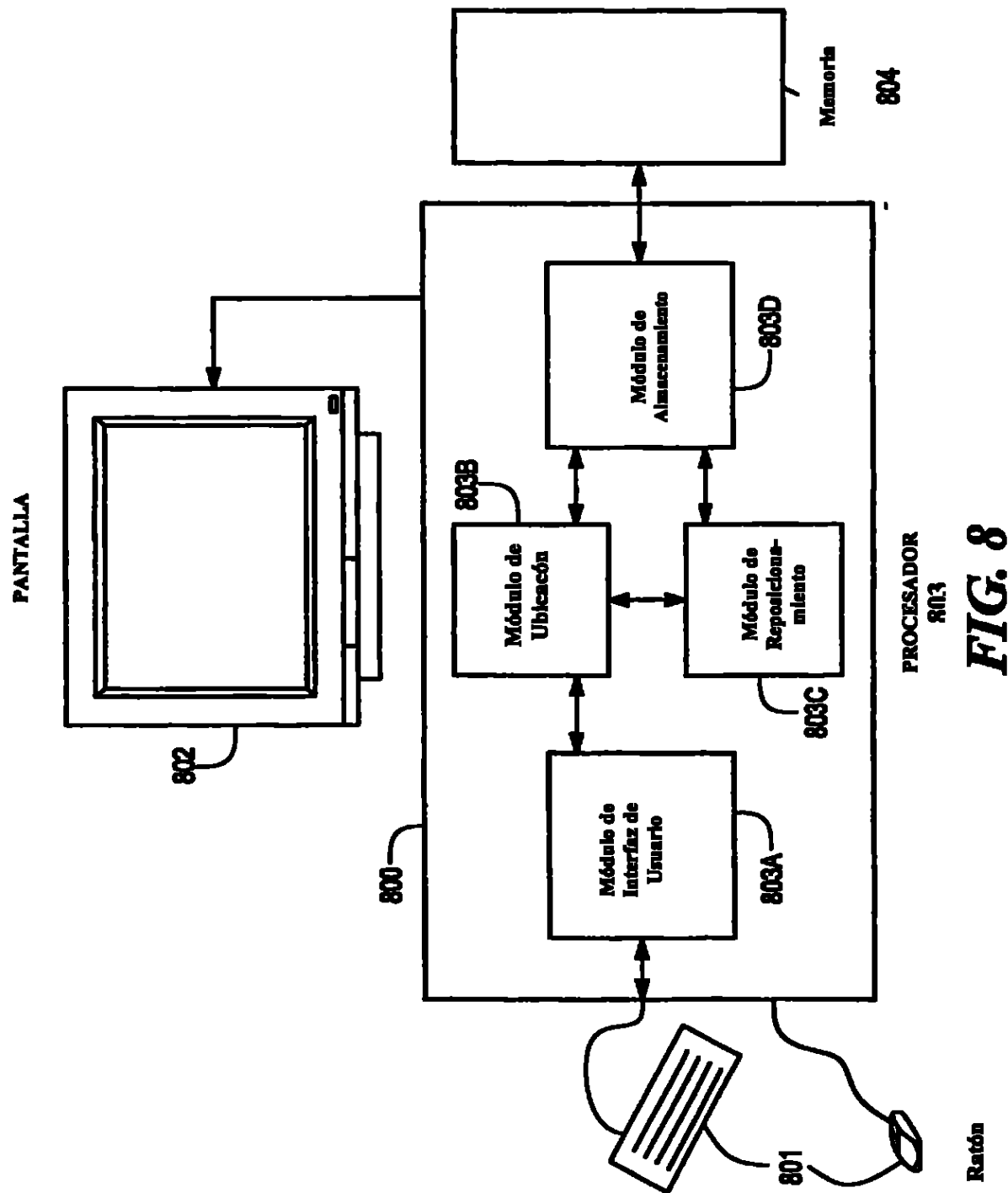


FIG. 7B

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FORMATO DE DIGITALIZACION
RELACION DE ANEXOS



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125

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8	SOBRE BLANCO TAMAÑO CARTA		
9	SOBRE BLANCO TAMAÑO OFICIO	1	
10	OTROS		
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126

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FECHA MARZO 30 DE 2004

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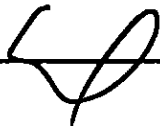
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CAVELIER ABOGADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	22156874	30/03/2004	42 288 000 00

***** C O N C E P T O *****

CANT	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50003-01-01 SOLICITUDES	7 TRAMITES DE SOL DE DISENOS INDUS	422,000 00
		TOTAL	\$ 422 000 00

SOM: CUATROCIENTOS VEINTIDOS MIL PESOS

RESPONSABLE



RECIBO DE CAJA APLICADO AL EXPEDIENTE No

Ado 14208-841-002-2

REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

PATENTE DE INVENCION

MODELO DE UTILIDAD

- Indicación de que se solicita la concesión de una patente
- Datos de identificación del solicitante o de la persona que se presenta la solicitud
- Descripción de la invención
- Dibujos de ser estos pertinentes
- Comprobante de Pago de las tasas establecidas

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- Datos de identificación del solicitante o de la persona que presenta la solicitud
- Representación gráfica del esquema de trazado
- Comprobante de pago de las tasas establecidas

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Dependencia 2020 DIVISION DE NUEVAS CREACIONES



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US0228352_20032003_FF_000001 G4" LX="0" LY="0"
TI="PA"/>

(57) A method for image stabilization of at least two digital images is disclosed. In such an embodiment, a first digital image having a plurality of pixels and at least a second image having a plurality of pixels are provided. Each pixel has an associated address for display and is representative of a color. Either a user of the system provides a color match range or the system provides a predetermined color matched range. A pixel is selected within the first digital image. Preferably the pixel is one that represents an item within the image that is either blurry due to movement of the item or appears jittery due to camera movement. Due to the vast number of available colors a pixel selected in a first image can be matched to a pixel in a second image within a range. The range allows for compensation due to lighting changes. Once the pixel in the first image is selected it can be compared to all pixels within the second image. Each pixel within the second image that is within the color match range is saved and the closest pixel color to the

