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PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Official

In Re The Application Of:) **Draft--for discussion purposes only**
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Shmuel Peleg, et al.)
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)
Serial No. 09/396,248) Examiner: Behrooz M. Senfi
)
)
Filed: September 16, 1999) Art Unit 2613
)
)
For: System and Method for Generating and Displaying Panoramic Images and Movies

RECEIVED
2/11/03

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February **, 2003

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Respectfully submitted

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Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

RESPONSE TO OFFICE ACTION

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This Response to Office Action is in response to the Office Action mailed November 29, 2002.

A. Clean Version Of Amended Portion(s) Of Application

In the Claims

The following are all claims that are to be pending in the above-referenced application as a result of this Response to Office Action. No claims have been deleted and no claims have been added. In addition, no claims have been amended.

- 1 28. A system for generating a stereoscopic panoramic mosaic image pair comprising:
- 2 A. a strip generator module configured to generate two series of image strips, all of said image
- 3 strips in each series comprising strips of a series of images of a scene as would be recorded
- 4 by a camera from a respective series of positions relative to the scene, the image strips of the
- 5 respective series representing strips of the respective images displaced from one another by
- 6 at least one selected displacement; and
- 7 B. a mosaic image generator module configured to mosaic the respective series of images strips
- 8 together thereby to construct two panoramic mosaic images, the panoramic mosaic images
- 9 comprising the stereoscopic panoramic mosaic image pair providing a stereoscopic image of
- 10 the scene as recorded over the path.
- 1 29. A system as defined in claim 28 in which the series of positions define a path at least a portion
- 2 of which corresponds to a curved arc.
- 1 30. A system as defined in claim 28 in which the series of positions define a path at least a portion
- 2 of which corresponds to a straight line.
- 1 31. A system as defined in claim 28 in which the series of positions define a translation relative to the
- 2 scene.

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- 1 32. A system as defined in claim 28 in which the series of positions define a change in angular
2 orientation relative to the scene.
- 1 33. A system as defined in claim 28 in which the image strips are parallel to an axis defined for the
2 respective image.
- 1 34. A system as defined in claim 33 in which the axis is horizontal.
- 1 35. A system as defined in claim 33 in which the axis is vertical.
- 1 36. A system as defined in claim 28 in which the strip generator module includes a camera configured
2 to record at least one image strip.
- 1 37. A system as defined in claim 36 in which the camera is configured to record a plurality of image
2 strips from both series.
- 1 38. A system as defined in claim 37 in which the strip generator module includes a plurality of
2 cameras configured to record at least image strips from both series, the plurality of cameras being
3 disposed at respective positions along the path.
- 1 39. A system as defined in claim 36 in which the strip generator module further includes
2 A. a reflector configured to reflect images of the scene to the camera for recording thereby of at
3 least the image strips; and
4 B. a reflector position control module configured to position the reflector at at least one position
5 to facilitate definition of the path.
- 1 40. A system as defined in claim 39 in which the reflector has at least one flat portion.
- 1 41. A system as defined in claim 39 in which the reflector has at least one curved portion.

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- 1 42. A system as defined in claim 39 in which the reflector position control module is configured to
2 position the reflector at a plurality of positions to facilitate definition of the path.
- 1 43. A system as defined in claim 28 in which the strip generator module is configured to generate at
2 least one image strip using a selected computer graphics methodology.
- 1 44. A system as defined in claim 43 in which the strip generator module is configured to generate a
2 plurality of image strips, at least one of the plurality of image strips being generated using the selected
3 computer graphics methodology.
- 1 45. A system as defined in claim 28 in which the strip generator module is configured to generate the
2 two series of image strips such that the displacement varies as between at least two images.
- 1 46. A system as defined in claim 45 in which the strip generator module includes
2 A. a camera configured to record a plurality of images; and
3 B. a strip selector module configured to select at least two image strips from respective ones of
4 the images, one of the selected image strips from each of the images being associated with
5 one of the respective series, the strip selector module being configured to control the locations
6 in the respective images from which the image strips are selected thereby to provide the
7 respective displacements.
- 1 47. A system as defined in claim 46 in which the strip selector module is configured to control the
2 locations in the respective images from which the image strips are selected by controlling the
3 separations of the image strips in the respective images.
- 1 48. A system as defined in claim 45 in which the strip generator module is configured to generate at
2 least some of said image strips using a selected computer graphics methodology.
- 1 49. A system as defined in claim 28 in which:
2 A. the strip generator module is further configured to generate a third series of image strips, all
3 of said image strips in said third series comprising strips of a series of images of a scene as

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4 would be recorded by a camera, the image strips of the third series being displaced from the
5 image strips of the other two series by another selected displacement; and
6 B. the mosaic image generator module is further configured to mosaic the third series of images
7 strips together thereby to construct a third panoramic mosaic image, a selected two of the
8 panoramic mosaic images comprising the stereoscopic panoramic mosaic image pair.

1 50. A system as defined in claim 28 in which:

2 A. the strip generator module is further configured to generate camera position information
3 representing positions of the camera associated with the respective image strips; and
4 B. the mosaic image generator module is further configured to use the camera position
5 information in constructing the panoramic mosaic images.

1 51. A system as defined in claim 28 in which the mosaic image generator module is configured to
2 generate at least one of the panoramic mosaic images by measuring image motion between successive
3 image strips using a selected computer vision technique.

4 52. A system for generating a stereoscopic panoramic mosaic image pair comprising:

5 A. a strip generator module configured to generate two series of image strips, all of said image
6 strips in each series comprising strips of a series of images of a scene as would be recorded
7 by a camera from a respective series of positions relative to the scene, the image strips of the
8 respective series representing strips of the respective images displaced from one another by
9 at least two selected displacements;
10 B. a mosaic image generator module configured to mosaic the respective series of images strips
11 together thereby to construct two panoramic mosaic images, the panoramic mosaic images
12 comprising the stereoscopic panoramic mosaic image pair providing a stereoscopic image of
13 the scene.

1 53. A system as defined in claim 52 in which the strip generator module includes

2 A. a camera configured to record a plurality of images; and
3 B. a strip selector module configured to select at least two image strips from respective ones of
4 the images, one of the selected image strips from each of the images being associated with

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5 one of the respective series, the strip selector module being configured to control the locations
6 in the respective images from which the image strips are selected thereby to provide the
7 respective displacements.

1 54. A system as defined in claim 52 in which the strip generator module is configured to generate at
2 least some of said image strips using a selected computer graphics methodology.

1 55. A system as defined in claim 52 in which:

- 2 A. the strip generator module is further configured to generate a third series of image strips, all
3 of said image strips in said third series comprising strips of a series of images of a scene as
4 would be recorded by a camera, the image strips of the third series being displaced from the
5 image strips of the other two series by another selected displacement; and
6 B. the mosaic image generator module is further configured to mosaic the third series of images
7 strips together thereby to construct a third panoramic mosaic image, a selected two of the
8 panoramic mosaic images comprising the stereoscopic panoramic mosaic image pair.

1 56. A system for displaying a stereo panoramic image to a viewer, said system comprising:

- 2 A. a panoramic screen;
3 B. a plurality of projectors each disposed to project a respective portion of one of a plurality
4 panoramic images in overlapping fashion on the screen, each panoramic image being for
5 viewing by a respective one of a viewer's eyes; and
6 C. a viewing arrangement for facilitating transmission of a respective one of said images to each
7 of the viewer's eyes thereby to facilitate stereoscopic viewing of the panoramic image defined
8 by the panoramic images.

1 57. A system as defined in claim 56 in which:

- 2 A. the respective panoramic images are polarized with orthogonal polarizations; and
3 B. the viewing arrangement comprises a pair of lenses polarized with corresponding orthogonal
4 polarizations.

1 58. A system as defined in claim 56 in which:

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- 2 A. the respective panoramic images are of different colors; and
3 B. the viewing arrangement comprises a pair of lenses having the corresponding colors.

1 59. A system for displaying a stereo panoramic image to a viewer, said system comprising:

- 2 A. a panoramic screen;
3 B. a plurality of projectors each configured to project a respective portion of a panoramic image
4 on the screen, the panoramic image comprising alternating portions of panoramic images each
5 to be alternatingly viewed by respective ones of a viewers eyes; and
6 C. a viewing arrangement for facilitating alternating transmission of the respective alternating
7 portions to respective ones of the viewer's eyes thereby to facilitate stereoscopic viewing of
8 the panoramic image.

1 60. A system as defined in claim 59 in which the viewing arrangement comprises a pair of lenses,
2 each lens being associated with a shutter, the shutters being configured to alternatingly open and close
3 in synchrony with the display of the respective alternating portions.

1 61. A method of generating a stereoscopic panoramic mosaic image pair comprising the steps of:

- 2 A. a strip generation step of generating two series of image strips, all of said image strips in each
3 series comprising strips of a series of images of a scene as would be recorded by a camera
4 from a respective series of positions relative to the scene, the image strips of the respective
5 series representing strips of the respective images displaced from one another by at least one
6 selected displacement; and
7 B. a mosaic image generation step of mosaicing the respective series of images strips together
8 thereby to construct two panoramic mosaic images, the panoramic mosaic images comprising
9 the stereoscopic panoramic mosaic image pair providing a stereoscopic image of the scene
10 as recorded over the path.

1 62. A method as defined in claim 61 in which the series of positions define a path at least a portion
2 of which corresponds to a circular arc.

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- 1 63. A method as defined in claim 61 in which the series of positions define a path at least a portion
2 of which corresponds to a straight line.
- 1 64. A method as defined in claim 61 in which the series of positions define a translation relative to
2 the scene.
- 1 65. A method as defined in claim 61 in which the series of positions define a change in angular
2 orientation relative to the scene.
- 1 66. A method as defined in claim 61 in which the image strips are parallel to an axis defined for the
2 respective image.
- 1 67. A method as defined in claim 66 in which the axis is horizontal.
- 1 68. A system as defined in claim 66 in which the axis is vertical.
- 1 69. A method as defined in claim 61 in which the strip generation step includes the step of using a
2 camera configured to record at least one image strip.
- 1 70. A method as defined in claim 69 in which the strip generation step includes the step of using a
2 camera configured to record a plurality of image strips from both series.
- 1 71. A method as defined in claim 70 in which the strip generation step includes the step of using a
2 plurality of cameras configured to record at least image strips from both series, the plurality of
3 cameras being disposed at respective positions along the path.
- 1 72. A method as defined in claim 69 in which the strip generation step further includes the steps of
2 A. using a reflector configured to reflect images of the scene to the camera for recording thereby;
3 and
4 B. positioning the reflector at at least one position to facilitate definition of the path.

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- 1 73. A method as defined in claim 72 in which the reflector has at least one flat portion.
- 1 74. A method as defined in claim 72 in which the reflector has at least one flat portion.
- 1 75. A method as defined in claim 72 in which the reflector positioning step includes the step of
2 positioning the reflector at a plurality of positions to facilitate definition of the path.
- 1 76. A method as defined in claim 61 in which the strip generation step includes the step of generating
2 at least one image strip using a selected computer graphics methodology.
- 1 77. A method as defined in claim 76 in which the strip generation step includes the step of generating
2 a plurality of image strips, at least one of the plurality of image strips being generated using the
3 selected computer graphics methodology.
- 1 78. A method as defined in claim 76 in which the strip generation step includes the step of generating
2 the two series of image strips such that the displacement varies as between at least two images.
- 1 79. A method as defined in claim 78 in which the strip generation step includes the steps of
2 A. using a camera to record a plurality of images; and
3 B. a strip selection step of selecting at least two image strips from respective ones of the images,
4 one of the selected image strips from each of the images being associated with one of the
5 respective series, the strip selection step including the step of controlling the locations in the
6 respective images from which the image strips are selected thereby to provide the respective
7 displacements.
- 1 80. A method as defined in claim 79 in which the strip selection step includes the step of controlling
2 the locations in the respective images from which the image strips are selected by controlling the
3 separations of the image strips in the respective images.
- 1 81. A method as defined in claim 78 in which the strip generation step includes the step of generating
2 at least some of said image strips using a selected computer graphics methodology.

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1 82. A method as defined in claim 61 in which:

- 2 A. the strip generation step includes the step of generating a third series of image strips, all of
3 said image strips in said third series comprising strips of a series of images of a scene as
4 would be recorded by a camera, the image strips of the third series being displaced from the
5 image strips of the other two series by another selected displacement; and
6 B. the mosaic image generation step includes the step of mosaicing the third series of images
7 strips together thereby to construct a third panoramic mosaic image, a selected two of the
8 panoramic mosaic images comprising the stereoscopic panoramic mosaic image pair.

1 83. A method as defined in claim 61 in which:

- 2 A. the strip generation step includes the step of generating camera position information
3 representing positions of the camera associated with the respective image strips; and
4 B. the mosaic image generation step includes the step of using the camera position information
5 in constructing the panoramic mosaic images.

1 84. A method as defined in claim 61 in which the mosaic image generation step includes the step of
2 generate at least one of the panoramic mosaic images by measuring image motion between successive
3 image strips using a selected computer vision technique.

1 85. A method for generating a stereoscopic panoramic mosaic image pair comprising:

- 2 A. a strip generation step of generating two series of image strips, all of said image strips in each
3 series comprising strips of a series of images of a scene as would be recorded by a camera
4 from a respective series of positions relative to the scene, the image strips of the respective
5 series representing strips of the respective images displaced from one another by at least two
6 selected displacements; and
7 B. a mosaic image generation step of mosaicing the respective series of images strips together
8 thereby to construct two panoramic mosaic images, the panoramic mosaic images comprising
9 the stereoscopic panoramic mosaic image pair providing a stereoscopic image of the scene.

1 86. A method as defined in claim 85 in which the strip generation step includes the steps of

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- 2 A. using a camera to record a plurality of images; and
3 B. a strip selection step of selecting at least two image strips from respective ones of the images,
4 one of the selected image strips from each of the images being associated with one of the
5 respective series, the strip selection step including the step of controlling the locations in the
6 respective images from which the image strips are selected thereby to provide the respective
7 displacements.

1 87. A method as defined in claim 86 in which the strip selection step includes the step of controlling
2 the locations in the respective images from which the image strips are selected by controlling the
3 separations of the image strips in the respective images.

1 88. A method as defined in claim 85 in which the strip generation step includes the step of generating
2 at least some of said image strips using a selected computer graphics methodology.

1 89. A method as defined in claim 85 in which:

- 2 A. the strip generation step includes the step of generating a third series of image strips, a third
3 series of image strips, all of said image strips in said third series comprising strips of a series
4 of images of a scene as would be recorded by a camera, the image strips of the third series
5 being displaced from the image strips of the other two series by another selected
6 displacement; and
7 B. the mosaic image generation step includes step of mosaicing the third series of images strips
8 together thereby to construct a third panoramic mosaic image, a selected two of the panoramic
9 mosaic images comprising the stereoscopic panoramic mosaic image pair.

1 90. A method as defined in claim 85 in which:

- 2 A. the strip generation step includes the step of generating camera position information
3 representing positions of the camera associated with the respective image strips; and
4 B. the mosaic image generation step includes the step of using the camera position information
5 in constructing the panoramic mosaic images.

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1 91. A method as defined in claim 85 in which the mosaic image generation step includes the step of
2 generate at least one of the panoramic mosaic images by measuring image motion between successive
3 image strips using a selected computer vision technique.

1 92. A method of displaying a stereo panoramic image to a viewer on a panoramic screen, said method
2 comprising the steps of:

3 A. using a plurality of projectors each disposed to project a respective portion of one of a
4 plurality panoramic images in overlapping fashion on the screen; and

5 C. using a viewing arrangement to facilitate transmission of a respective one of said images to
6 each of the viewer's eyes thereby to facilitate stereoscopic viewing of the panoramic image
7 defined by the respective panoramic images.

1 93. A method as defined in claim 92 in which:

2 A. the respective panoramic images are polarized with orthogonal polarizations; and

3 B. the viewing arrangement using step includes the step of using a viewing arrangement that
4 comprises a pair of lenses polarized with corresponding orthogonal polarizations.

1 94. A method as defined in claim 92 in which:

2 A. the respective panoramic images are of different colors; and

3 B. the viewing arrangement using step includes the step of using a viewing arrangement that
4 comprises a pair of lenses having the corresponding colors.

1 95. A method displaying a stereo panoramic image to a viewer on a panoramic screen, said method
2 comprising the steps of:

3 A. using a plurality of projectors each configured to project a respective portion of a panoramic
4 image on the screen, the panoramic image comprising alternating portions of panoramic
5 images each to be alternately viewed by respective ones of a viewers eyes; and

6 C. using a viewing arrangement for facilitating alternating transmission of the respective
7 alternating portions to respective ones of the viewer's eyes thereby to facilitate stereoscopic
8 viewing of the panoramic image.

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1 96. A method as defined in claim 95 in which the viewing arrangement comprises a pair of lenses,
2 each lens being associated with a shutter, the method including the step of controlling the shutters to
3 alternatingly open and close in synchrony with the display of the respective alternating portions.

1 97. A computer program product for use in connection with a computer to provide a system for
2 generating a stereoscopic panoramic mosaic image pair, the computer program product comprising
3 a computer-readable medium having encoded thereon:

4 A. a strip generator module configured to enable the computer to generate two series of image
5 strips, all of said image strips in each series comprising strips of a series of images of a scene
6 as would be recorded by a camera from a respective series of positions relative to the scene,
7 the image strips of the respective series representing strips of the respective images displaced
8 from one another by at least one selected displacement; and

9 B. a mosaic image generator module configured to enable the computer to mosaic the respective
10 series of images strips together thereby to construct two panoramic mosaic images, the
11 panoramic mosaic images comprising the stereoscopic panoramic mosaic image pair
12 providing a stereoscopic image of the scene as recorded over the path.

1 98. A computer program product as defined in claim 97 in which the series of positions define a path
2 at least a portion of which corresponds to a circular arc.

1 99. A computer program product as defined in claim 97 in which the series of positions define a path
2 at least a portion of which corresponds to a straight line.

1 100. A computer program product as defined in claim 97 in which the series of positions define a
2 translation relative to the scene.

1 101. A computer program product as defined in claim 97 in which the series of positions define a
2 change in angular orientation relative to the scene.

1 102. A computer program product as defined in claim 97 in which the image strips are parallel to an
2 axis defined for the respective image.

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- 1 103. A computer program product as defined in claim 102 in which the axis is horizontal.
- 1 104. A computer program product as defined in claim 102 in which the axis is vertical.
- 1 105. A computer program product as defined in claim 97, the system further including a camera
2 configured to record an image including at least one image strip, the strip generator module being
3 further configured to enable the computer to generate the at least one image strip from the image.
- 1 106. A computer program product as defined in claim 105 in which the camera is configured to
2 record a plurality of images each including at least one image strip from both series, the strip
3 generator module being further configured to enable the computer to generate the respective image
4 strips from the respective images.
- 1 107. A computer program product as defined in claim 106 in which system includes a plurality of
2 cameras configured to record at least image strips from both series, the plurality of cameras being
3 disposed at respective positions along the path.
- 1 108. A computer program product as defined in claim 105 in which
2 A. the system further includes a reflector configured to reflect images of the scene to the camera
3 for recording thereby; and
4 B. the strip generator module further includes a reflector position control module configured to
5 enable the computer to enable the reflector to be positioned at at least one position to facilitate
6 definition of the path.
- 1 109. A computer program product as defined in claim 108 in which the reflector has at least one flat
2 portion.
- 1 110. A computer program product as defined in claim 108 in which the reflector has at least one flat
2 portion.

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1 111. A computer program product as defined in claim 108 in which the reflector position control
2 module is configured to enable the computer to enable the reflector to be positioned at a plurality of
3 positions to facilitate definition of the path.

1 112. A computer program product as defined in claim 97 in which the strip generator module is
2 configured to enable the computer to generate at least one image strip using a selected computer
3 graphics methodology.

1 113. A computer program product as defined in claim 112 in which the strip generator module is
2 configured to enable the computer to generate a plurality of image strips, at least one of the plurality
3 of image strips being generated using the selected computer graphics methodology.

1 114. A computer program product as defined in claim 97 in which the strip generator module is
2 configured to enable the computer to generate generate the two series of image strips such that the
3 displacement varies as between at least two images.

1 115. A computer program product as defined in claim 114 in which:

2 A. the system includes a camera configured to record a plurality of images; and

3 B. the strip generator module includes a strip selector module configured to enable the computer
4 to select at least two image strips from respective ones of the images, one of the selected
5 image strips from each of the images being associated with one of the respective series, the
6 strip selector module being configured to enable the computer to control the locations in the
7 respective images from which the image strips are selected thereby to provide the respective
8 displacements.

1 116. A computer program product as defined in claim 115 in which the strip selector module is
2 configured to enable the computer to control the locations in the respective images from which the
3 image strips are selected by controlling the separations of the image strips in the respective images.

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1 117. A computer program product as defined in claim 114 in which the strip generator module is
2 configured to enable the computer to generate at least some of said image strips using a selected
3 computer graphics methodology.

1 118. A computer program product as defined in claim 97 in which:

2 A. the strip generator module is further configured to enable the computer to generate a third
3 series of image strips, all of said image strips in said third series comprising strips of a series
4 of images of a scene as would be recorded by a camera, the image strips of the third series
5 being displaced from the image strips of the other two series by another selected
6 displacement; and

7 B. the mosaic image generator module is further configured to enable the computer to mosaic
8 the third series of images strips together thereby to construct a third panoramic mosaic image,
9 a selected two of the panoramic mosaic images comprising the stereoscopic panoramic
10 mosaic image pair.

1 119. A computer program product as defined in claim 97 in which:

2 A. the strip generator module is further configured to enable the computer to generate camera
3 position information representing positions of the camera associated with the respective image
4 strips; and

5 B. the mosaic image generator module is further configured to enable the computer to use the
6 camera position information in constructing the panoramic mosaic images.

1 120. A computer program product as defined in claim 97 in which the mosaic image generator
2 module is configured to enable the computer to generate at least one of the panoramic mosaic images
3 by measuring image motion between successive image strips using a selected computer vision
4 technique.

1 121. A computer program product for use in connection with a computer to provide a system for
2 generating a stereoscopic panoramic mosaic image pair, the computer program product comprising
3 a computer readable medium having encoded thereon:

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- 4 A. a strip generator module configured to enable the computer to generate two series of image
5 strips, all of said image strips in each series comprising strips of a series of images of a scene
6 as would be recorded by a camera from a respective series of positions relative to the scene,
7 the image strips of the respective series representing strips of the respective images displaced
8 from one another by at least two selected displacements;
- 9 B. a mosaio image generator module configured to enable the computer to mosaio the respective
10 series of images strips together thereby to construct two panoramic mosaio images, the
11 panoramic mosaio images comprising the stereoscopic panoramic mosaio image pair
12 providing a stereoscopic image of the scene.

1 122. A computer program product as defined in claim 121 in which

- 2 A. the system includes a camera configured to record a plurality of images; and
- 3 B. the strip generator module includes a strip selector module configured to enable the computer
4 to select at least two image strips from respective ones of the images, one of the selected
5 image strips from each of the images being associated with one of the respective series, the
6 strip selector module being configured to control the locations in the respective images from
7 which the image strips are selected thereby to provide the respective sets of angles.

1 123. A computer program product as defined in claim 122 in which the strip selector module is
2 configured to enable the computer to control the locations in the respective images from which the
3 image strips are selected by controlling the separations of the image strips in the respective images.

1 124. A computer program product as defined in claim 121 in which the strip generator module is
2 configured to enable the computer to generate at least some of said image strips using a selected
3 computer graphics methodology.

1 125. A computer program product as defined in claim 121 in which:

- 2 A. the strip generator module is further configured to enable the computer to generate a third
3 series of image strips, all of said image strips in said third series comprising strips of a series
4 of images of a scene as would be recorded by a camera, the image strips of the third series

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5 being displaced from the image strips of the other two series by another selected
6 displacement; and
7 B. the mosaic image generator module is further configured to enable the computer to mosaic
8 the third series of images strips together thereby to construct a third panoramic mosaic image,
9 a selected two of the panoramic mosaic images comprising the stereoscopic panoramic
10 mosaic image pair.

1 126. A computer program product as defined in claim 121 in which:

- 2 A. the strip generator module is further configured to enable the computer to generate camera
3 position information representing positions of the camera associated with the respective image
4 strips; and
5 B. the mosaic image generator module is further configured to enable the computer to use the
6 camera position information in constructing the panoramic mosaic images.

1 127. A computer program product as defined in claim 121 in which the mosaic image generator
2 module is configured to enable the computer to generate at least one of the panoramic mosaic images
3 by measuring image motion between successive image strips using a selected computer vision
4 technique.

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B. Marked-Up Version Of Amended Portion(s) Of Application To Show Changes Made

In the Claims

The changes made to the previously-pending claims are: None

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REMARKS

The Office Action mailed November 29, 2002, has been carefully considered.

In the Office Action, the Examiner rejected claims 28, 31-47, 48-55, 61, 64-91, 97, 100-127 under 35 U. S. C. §103 as being unpatentable over U. S. Patent No. 5,963,664 to Kumar et al. ("Kumar") in view of U. S. Patent No. 5,049,987 to Hoppenstein, claims 29-30, 62-63, and 98-99 under 35 U. S. C. §103 as being obvious over Kumar and Hoppenstein, and further in view of U. S. Patent No. 6,331,871 to Taylor. In addition, the Examiner rejected claims 56-60 and 92-96 under 35 U. S. C. §103 as being obvious over U. S. Patent No. 5,929,951 to Sasakura, et al. ("Sasakura"), in view of U. S. Patent No. 5,130,794 to Ritchey ("Ritchey").

Applicants respectfully traverse the rejection.

Applicants will initially address independent apparatus claim 28, as also being representative of independent method claim 61 and independent computer program product claim 97. Claim 28 is directed to a system for generating a *stereoscopic* panoramic mosaic image pair comprising a strip generator module and a mosaic image generator module. The strip generator module is configured to generate two series of image strips. All of the image strips in each series comprise strips of a series of images of a scene as would be recorded by a camera from a respective series of positions relative to the scene. The image strips of the respective series represent strips of the respective images displaced from one another by at least one selected displacement. The mosaic image generator module is configured to mosaic the respective series of images strips together thereby to construct two panoramic mosaic images, with the panoramic mosaic images comprising the *stereoscopic* panoramic mosaic image pair providing a *stereoscopic* image of the scene as recorded over the path. (Emphasis added)

Kumar describes a system for generating a three-dimensional mosaic of a scene using a plurality of images of the scene, at least two of which have regions that overlap, but which, in general, depict the scene from differing viewpoints. In Kumar's system, information from the images is used to generate what is referred to as a "three-dimensional mosaic," which actually comprises two mosaics, one of which is referred to as an image mosaic, and the other of which is referred to as a shape mosaic. The image mosaic represents a panoramic view of the scene, while the shape mosaic

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represents the three-dimensional geometry of the scene. As described in connection with FIG. 2 (column 5, line 18, et seq.), in the image mosaic, the images are aligned according to an arbitrary parametric surface extending through all of the images. This requires both parametric translation parameters and a planar motion field. The shape mosaic contains a parallax motion field that relates the three-dimensional objects that are depicted in the images to one another and to the parametric surface. The planar motion field represents motion within the parametric surface that appears in the images from source image to source image, while the parallax motion field represents motion due to parallax of the three-dimensional objects in the scene with respect to the parametric surface.

As noted above, the arrangement recited in claim 28 generates a *stereoscopic* panoramic image pair. Generally, "stereoscopic" refers to "of, like, or something used in a *stereoscope*." A *stereoscope*, in turn, is "an instrument that gives a three dimensional effect to photographs viewed through it: it has two eyepieces, through which slightly different views of the same scene are viewed *side by side*." (Emphasis added, reference from, for example, Webster's New World Dictionary of the American Language, College Edition.) From the manner in which the strip generator module is recited in claim 28 as generating the two panoramic mosaic images, it should be apparent that they provide "slightly different views of the same scene." Moreover, regardless of the particular device that a user uses to view the "slightly different views of the same scene...side by side," it should further be apparent that the two panoramic mosaic images contain similar types of information regarding the scene. Both are two-dimensional images of the same scene.

This is clearly not the case with the image and shape mosaics that comprise Kumar's "three-dimensional mosaic." As noted above, the two mosaics represent significantly different types of information. The image mosaic is generated using the parametric translation parameters and a planar motion field, whereas the shape mosaic is generated using the parallax motion field. The types of information reflected in the image mosaic and the shape mosaic are very different. Accordingly, Applicants respectfully submit that, even if the two mosaics are images (and Kumar does not appear to specifically refer to them as *images*), given that the two essentially provide very different types of information, they are not a *stereoscopic* panoramic image pair. They do not represent "slightly different views of the same scene" that, when viewed "side by side" will provide a "three-dimensional effect."

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Moreover, it should be apparent that, whereas the system recited in claim 28 generates two two-dimensional images of a scene that, when viewed simultaneously by respective eyes of a viewer, provides a three-dimensional view of the scene, Kumar teaches a system that generates one two-dimensional image (the "image mosaic") of the scene and an object (the "shape mosaic") that represents a three-dimensional description of the scene. Kumar's generation of the shape mosaic requires processing to generate the "three-dimensional" description of the scene represented by the shape mosaic, which processing is not contemplated by or even required by the system recited in claim 28. The system recited in claim 28 goes directly from input images to mosaic images that provide the stereoscopic "three dimensional effect."

Accordingly, Applicants respectfully submit that Kumar neither teaches nor suggests the invention recited in claim 28.

The Examiner cited Hoppenstein as teaching dividing "the target image" into a plurality of image strips. Preliminarily, Applicants note that it is difficult to determine what the Examiner is referring to as "the target image." In point of fact, in claim 28, the images from which strips are generated are the source images, which strips are used to generate the panoramic mosaic images. (As noted in the previous Office Action response, the strip generator module is recited as generating image strips from images as would be recorded by a camera, so as to make clear that the images would not actually need to be recorded by a camera, but instead may be generated by other means, and further to make clear that the strip generator module does not have to generate, for each image strip, an entire image—instead, the strip generator module need only generate the respective image strip.) On the other hand, in Hoppenstein, it appears that the strips are the images that are to be stored. There appears to be no suggestion that the strips are mosaiced together to form a panoramic mosaic image, as set forth in claim 28. More particularly, even assuming, arguendo, that Hoppenstein does teach dividing "the target image" into a plurality of image strips, Applicants respectfully submit that there is no suggestion in Hoppenstein of generating two panoramic mosaic images that comprise a stereoscopic panoramic mosaic image pair. To the contrary, Hoppenstein teaches an arrangement that provides a single two-dimensional image of a scene that can be viewed through a lenticular lens to provide a three-dimensional effect

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Moreover, even assuming, *arguendo*, that Hoppenstein teaches dividing an image into a plurality of strips, there is no suggestion how the strips might be used in the system described in Kumar to generate a stereoscopic panoramic image pair, as is generated by the arrangement recited in claim 28. Most notably, as noted above, Kumar describes generating the shape mosaic in connection with the parallax motion field. Claim 28 specifies that both of the panoramic mosaic images that comprise stereoscopic panoramic mosaic image pair are constructed from respective series of strips, but, even assuming *arguendo* that it might be apparent how Kumar's *image* mosaic might be constructed from a series of image strips, it is far from apparent how Kumar's *shape* mosaic might be constructed from a series of image strips.

Accordingly, Applicants respectfully submit that neither Kumar nor Hoppenstein, whether considered individually or in combination, teach or suggest the invention recited in claim 28.

Applicants further submit that independent method claim 61 and independent computer program product claim 97 are allowable for the reasons set forth above in connection with claim 28.

Claims 52, 85 and 121 are similar to claims 28, 61 and 97, respectively, except that they require there to be two different displacements. Applicants respectfully submit that claims 52, 85 and 121 are allowable for the reasons set forth above in connection with 28, 61 and 97.

Applicants will address apparatus claim 56, as also representative of method claim 92. Claim 56 is directed to a system for displaying a stereo panoramic image to a viewer, the system comprising a panoramic screen, a plurality of projectors, and a viewing arrangement. Each of the projectors is disposed to project a respective portion of one of a plurality panoramic images in overlapping fashion on the screen, each panoramic image being for viewing by a respective one of a viewer's eyes. The viewing arrangement is recited as facilitating transmission of a respective one of the images to each of the viewer's eyes thereby to facilitate stereoscopic viewing of the panoramic image defined by the panoramic images.

As noted above, the Examiner rejected claim 56 under 35 U. S. C. §103 as being obvious over Sasakura in view of Ritchie. In the portion of Sasakura cited by the Examiner, the patent describes a head-mounted display device that includes two eyepieces, one for each eye, with each eyepiece directing an image to the respective eye. The Examiner recognizes that Sasakura does not suggest

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the claimed "plurality of projectors," and cites Ritchie as teaching those elements, particularly FIG. 36 and column 32, lines 56, et seq. While Ritchie does, in fact, teach a display arrangement that includes a plurality of projectors, Applicants respectfully submit that it does not teach projectors for displaying a respective one of a plurality of panoramic images to a viewer in overlapping fashion on a screen. Indeed, returning to Sasakura, Applicants respectfully submit that Sasakura does not suggest a viewing arrangement that facilitates transmission of a respective one of a plurality of images that are projected onto a screen in overlapping fashion, to a respective eye to facilitate stereoscopic viewing of a panoramic image defined by the panoramic images. Indeed, neither Sasakura nor Ritchie suggest any overlap in images projected onto a screen, as required in the claim. Accordingly, Applicants respectfully submit that neither Sasakura nor Ritchie, whether considered individually or in combination, teach or suggest the invention recited in claim 56.

Applicants further submit that method claim 92 is allowable for the reasons described above in connection with claim 56.

Applicants further submit that dependent apparatus claims 57-60 and method claims 93-96 are allowable at least for the reason that they depend from allowable independent claims 56 and 92, respectively.

In view of the above, Applicants respectfully traverse the rejection.

It is believed that this application is allowable, and a notice of allowability is respectfully solicited.

Respectfully submitted,



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