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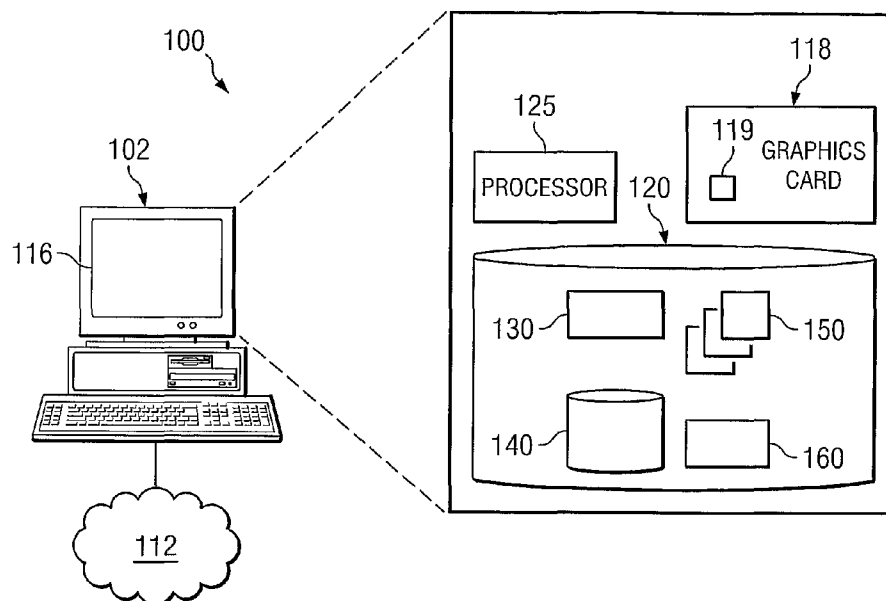
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(54) Title: SYSTEM AND METHOD FOR INFRARED SENSOR SIMULATION



(57) Abstract: Software for generating a sensor simulation image comprises computer-readable instructions and identifies a visual image with a first resolution and identifies a material image with a second resolution, with the material image spatially correlated with the visual image. The software then generates a second material image with the first resolution using the visual image and the material image. Using the second material image, the software generates a sensor image, the sensor image comprising a plurality of texels and each texel storing a plurality of analogical parameters. Spatial frequency is added to the sensor image using a high frequency image. The software loads a thermal lookup table indexed by the plurality of analogical parameters and dynamically generates an at-aperture radiance image for one of a plurality of times of day using the reflectance image and the thermal lookup table and applying a radiometric equation.

WO 2006/135376 A3



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RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
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Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, INSPEC, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 735 557 B1 (CASTELLAR JAVIER [US] ET AL) 11 May 2004 (2004-05-11) column 27, line 18 - line 28 column 29, line 10 - line 16; figures 4A-4B	1,7,13
Y	----- LAPORTIERE F: "representations hierarchiques d'images avec des pyramides morphologiques. Application à l'analyse et à la fusion spatio-temporelle de données en observation de la terre" THESIS, XX, XX, 28 March 2002 (2002-03-28), pages 139-152, XP002404656 page 139, line 6 - line 11; figure 7.9 ----- -/--	1,7,13
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *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		
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Name and mailing address of the ISA/ 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 PEREZ MOLINA, E

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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	WALD L ET AL: "Increasing the spatial resolution of gridded data by fusion with other data sets" INFORMATION FUSION, 2003. PROCEEDINGS OF THE SIXTH INTERNATIONAL CONFERENCE OF JULY 8-11, 2003, PISCATAWAY, NJ, USA, IEEE, vol. 1, 8 July 2003 (2003-07-08), pages 181-184, XP010676549 page 181, left-hand column, paragraph 1	1-18
A	J. ZHAOYI ET AL.: "infrared image synthesis for bridges" THERMOSENSE XXVI, DOUGLAS D. BURLEIGH, K. ELLIOT CRAMER, G. RAYMOND PEACOCK, EDITORS, PROCEEDINGS OF THE SPIE, vol. 5404, April 2004 (2004-04), pages 167-176, XP002423130 page 172, paragraph 4.2	1-18
A	GAMBOTTO J-P ED - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "Combining image analysis and thermal models for infrared scene simulations" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP) AUSTIN, NOV. 13 - 16, 1994, LOS ALAMITOS, IEEE COMP. SOC. PRESS, US, vol. VOL. 3 CONF. 1, 13 November 1994 (1994-11-13), pages 710-714, XP010145992 ISBN: 0-8186-6952-7 abstract page 712, left-hand column, paragraph 4.1 - right-hand column, paragraph 4.3; figure 4	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6735557	B1	11-05-2004	NONE