(19) World Intellectual Property Organization International Bureau



(43) International Publication Date 12 June 2003 (12.06.2003)

PCT

(10) International Publication Number WO 03/049032 A3

(51) International Patent Classification⁷: G06T 5/00

(21) International Application Number: PCT/IB02/05081

(22) International Filing Date: 2 December 2002 (02.12.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 01403180.1 7 December 2001 (07.12.2001) EH

(71) Applicant (for all designated States except US): KONIN-KLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

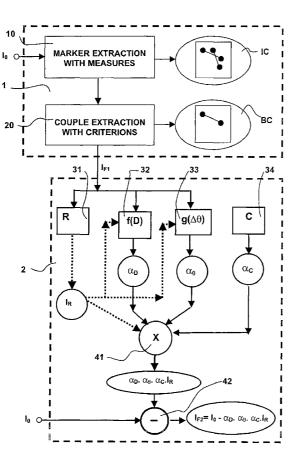
(75) Inventors/Applicants (for US only): FLORENT, Raoul [FR/NL]; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

NOSJEAN, Lucile [FR/NL]; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). LELONG, Pierre [FR/NL]; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

- (74) Agent: LOTTIN, Claudine; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK,

[Continued on next page]

(54) Title: MEDICAL VIEWING SYSTEM AND METHOD FOR SPATIALLY ENHANCING STRUCTURES IN NOISY IMAGES



(57) Abstract: A viewing system and method for enhancing objects of interest represented on a moving background in a sequence of noisy images and for displaying the sequence of enhanced images, comprising extracting means (1) for extracting features related to an object of interest in images of the sequence; spatial enhancement means (2) that comprise a ridge filter modulated by factor means to enhance the object of interest to the exclusion of the objects of the background; and display means (54) for displaying the processed images (15, 45) of the enhanced registered object of interest on faded background.



TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

18 December 2003

INTERNATIONAL SEARCH REPORT

al Application No PCT/IB 02/05081

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06T5/00 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 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, PAJ, INSPEC C. DOCUMENTS CONSIDERED TO BE RELEVANT Category ° Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. X WO 01 31583 A (KONINKL PHILIPS ELECTRONICS 1-5.11NV) 3 May 2001 (2001-05-03) A 6-10,12page 1, line 1-20 page 2, column 5 -column 18 page 3, line 13 -page 4, line 19 page 5, line 6 - line 23 page 6, line 24 - line 32 page 7, line 9 - line 23 figures 2A-2D χ US 5 687 251 A (ERLER BRIAN S ET AL) 1,3,4 11 November 1997 (1997-11-11) figures 1,4-7 Α 5-12 column 2, line 22 - line 50 column 6, line 42 - line 55 column 7, line 23 - line 28 Further documents are listed in the continuation of box C. Patent family members are listed in annex. ° Special categories of cited documents: '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 "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 "X" document of particular relevance; the claimed invention filing date cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another "Y" document of particular relevance; the claimed invention citation or other special reason (as specified) 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 ord "O" document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 29 September 2003 13/10/2003 Name and mailing address of the ISA Authorized officer 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

Form PCT/ISA/210 (second sheet) (July 1992)

Ellerbrock, T

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/IB 02/05081

C.(Continu	Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT egory o Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.						
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.					
A	R.C. GONZALES, R.E.WOODS: "Digital Image Processing" 1992 , ADDSION WESLEY- PUBLISHING COMPANY , NEW YORK XP002255181 page 195 -page 197 figure 4.27	5					
Α	US 5 784 431 A (ATHANASSIOU CHARALAMBOS NET AL) 21 July 1998 (1998-07-21) column 1, line 5 - line 14 column 2, line 56 - line 67 figure 1	11					
A	US 5 343 390 A (KATSURAGAWA SHIGEHIKO ET AL) 30 August 1994 (1994-08-30) column 12, line 43 -column 15, line 5; figures 15A,15B	1-5					
A	CHU C H ET AL: "Automatic interpretation of echocardiograms-a computer vision approach" 1988 IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS. PROCEEDINGS , 7 June 1988 (1988-06-07), pages 2611-2614, XP010069451 figures 2,3	1-5					

INTERNATIONAL SEARCH REPORT

mation on patent family members

Internation Application No
PCT/IB 02/05081

Publication date		Patent family member(s)		Publication date
03-05-2001	WO EP JP	1208537	A1	03-05-2001 29-05-2002 08-04-2003
11-11-1997	EP	0610916 /	A2	17-08-1994
21-07-1998	AU CN EP JP KR WO	1235684 / 0934573 / 2001503176 7 2000052875 /	A A 1 T A	22-05-1998 17-11-1999 11-08-1999 06-03-2001 25-08-2000 07-05-1998
30-08-1994	JP JP		_	28-04-2003 30-08-1994
	date 03-05-2001 11-11-1997 21-07-1998	03-05-2001 WO EP JP 11-11-1997 EP 21-07-1998 AU CN EP JP KR WO 30-08-1994 JP	date member(s) 03-05-2001 W0 0131583 EP 1208537 JP 2003513376 11-11-1997 EP 0610916 21-07-1998 AU 5002997 CN 1235684 EP 0934573 JP 2001503176 KR 2000052875 W0 9819272 30-08-1994 JP 3400008	03-05-2001 W0 0131583 A1 EP 1208537 A1 JP 2003513376 T 11-11-1997 EP 0610916 A2 21-07-1998 AU 5002997 A CN 1235684 A EP 0934573 A1 JP 2001503176 T KR 2000052875 A W0 9819272 A1 30-08-1994 JP 3400008 B2