

Title (en)

METHOD AND SYSTEM FOR SCANNING A SURFACE AND GENERATING A THREE-DIMENSIONAL OBJECT

Title (de)

VERFAHREN UND SYSTEM ZUM SCANNEN EINER OBERFLÄCHE UND ZUM ERZEUGEN EINES DREIDIMENSIONALEN OBJEKTS

Title (fr)

PROCEDE ET SYSTEME DESTINES A BALAYER UNE SURFACE ET A PRODUIRE UN OBJET TRIDIMENSIONNEL

Publication

EP 1287482 A4 20070711 (EN)

Application

EP 01925005 A 20010413

Priority

- US 0112107 W 20010413
- US 56013100 A 20000428
- US 56013200 A 20000428
- US 56058300 A 20000428
- US 56064400 A 20000428
- US 56064500 A 20000428
- US 56013300 A 20000428
- US 56058400 A 20000428
- US 61609300 A 20000713

Abstract (en)

[origin: WO0184479A1] An image is projected upon a surface of a three dimensional object (611), the image can include a pattern having plurality of individual shapes used to measure and map the surface. The image further comprises a feature containing an encoding information for identifying the plurality of shapes individually. The feature containing encoding information is oriented such that encoding information is retrieved along a line perpendicular to a plane formed by the projection axis and the point along the view axis (613). The use of the feature is used to perform multiframe independent scanning (612).

IPC 1-7

G01B 11/25; **G06T 7/00**; **A61C 3/00**; **A61C 7/00**

IPC 8 full level

A61C 7/00 (2006.01); **A61C 7/14** (2006.01); **A61C 9/00** (2006.01); **A61C 13/34** (2006.01); **A61C 19/04** (2006.01); **G01B 11/24** (2006.01); **G01B 11/25** (2006.01); **G01B 21/20** (2006.01); **G03C 9/08** (2006.01); **G06K 7/00** (2006.01); **G06T 1/00** (2006.01); **G06T 7/00** (2006.01); **G09B 23/30** (2006.01); **A61F 2/30** (2006.01)

CPC (source: EP)

A61C 7/00 (2013.01); **A61C 7/146** (2013.01); **A61C 9/006** (2013.01); **G01B 11/2509** (2013.01); **G06T 7/33** (2016.12); **G06T 7/521** (2016.12); **A61C 7/002** (2013.01); **A61F 2002/30953** (2013.01); **G06T 2207/10028** (2013.01); **G06T 2207/30036** (2013.01)

Citation (search report)

- [X] DE 19638727 A1 19980319 - RUBBERT RUEDGER DIPL ING [DE]
- [XA] DE 19543347 A1 19970507 - BREUCKMANN GMBH [DE]
- [X] US 5568384 A 19961022 - ROBB RICHARD A [US], et al
- [X] DE 4402414 A1 19940825 - OESTERR FORSCH SEIBERSDORF [AT]
- [A] US 4294544 A 19811013 - ALTSCHULER BRUCE R, et al
- [X] DUWE H -P: "Optical digitizing and strategies to combine different views of an optical sensor", PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING SPIE-INT. SOC. OPT. ENG USA, vol. 3102, 1997, pages 2 - 4, XP002406501, ISSN: 0277-786X
- [X] OSTEN W: "Application of optical shape measurement for the nondestructive evaluation of complex objects", OPTICAL ENGINEERING SPIE USA, vol. 39, no. 1, January 2000 (2000-01-01), pages 232 - 243, XP002406502, ISSN: 0091-3286
- [A] DIRKSEN D ET AL: "Three-dimensional acquisition and visualization of dental arch features from optically digitized models.", JOURNAL OF OROFACIAL ORTHOPEDICS = FORTSCHRITTE DER KIEFERORTHOPÄDIE : ORGAN/OFFICIAL JOURNAL DEUTSCHE GESELLSCHAFT FÜR KIEFERORTHOPÄDIE, 1999, vol. 60, no. 2, 1999, pages 152 - 159, XP002406503, ISSN: 1434-5293
- [X] GRIFFIN P M ET AL: "GENERATION OF UNIQUELY ENCODED LIGHT PATTERNS FOR RANGE DATA ACQUISITION", PATTERN RECOGNITION, ELSEVIER, KIDLINGTON, GB, vol. 25, no. 6, 1 June 1992 (1992-06-01), pages 609 - 616, XP000290629, ISSN: 0031-3203
- [X] MINORU MARUYAMA ET AL: "RANGE SENSING BY PROJECTING MULTIPLE SLITS WITH RANDOM CUTS", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE SERVICE CENTER, LOS ALAMITOS, CA, US, vol. 15, no. 6, 1 June 1993 (1993-06-01), pages 647 - 651, XP000369964, ISSN: 0162-8828
- [XA] YAMAMOTO H ET AL: "RANGE IMAGING SYSTEM BASED ON BINARY IMAGE ACCUMULATION", PROCEEDINGS OF THE INTERNATIONAL JOINT CONFERENCE ON PATTERN RECOGNITION. PARIS, OCT. 27 - 31, 1986, LOS ANGELES, IEEE COMP. SOC. PRESS, US, vol. CONF. 8, 27 October 1986 (1986-10-27), pages 233 - 235, XP001048543
- [X] DO H C ET AL: "Registration of multiple-range views using the reverse-calibration technique", PATTERN RECOGNITION, ELSEVIER, KIDLINGTON, GB, vol. 31, no. 4, April 1998 (1998-04-01), pages 457 - 464, XP004108148, ISSN: 0031-3203
- [X] BESL P J ET AL: "A METHOD FOR REGISTRATION OF 3-D SHAPES", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE SERVICE CENTER, LOS ALAMITOS, CA, US, vol. 14, no. 2, 1 February 1992 (1992-02-01), pages 239 - 256, XP000248481, ISSN: 0162-8828
- [X] OSTEN W ET AL: "General hierarchical approach in absolute phase measurement", PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING SPIE-INT. SOC. OPT. ENG USA, vol. 2860, 1996, pages 2 - 13, XP002433861, ISSN: 0277-786X
- [X] MERMELSTEIN M S ET AL: "Video-rate surface profiling with acousto-optic accordion fringe interferometry", OPTICAL ENGINEERING SPIE USA, vol. 39, no. 1, January 2000 (2000-01-01), pages 106 - 113, XP002433862, ISSN: 0091-3286
- [A] KAYSER D ET AL: "Fault detection in gray-value images of surfaces on different scales", PROC SPIE INT SOC OPT ENG; PROCEEDINGS OF SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING 1999 SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS, BELLINGHAM, WA, USA, vol. 3744, 1999, pages 110 - 117, XP002433863
- [X] ALTSCHULER BRUCE R: "Remote 3-D laser topographic mapping with dental application", PROC SPIE INT SOC OPT ENG; PROCEEDINGS OF SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING 1991 PUBL BY INT SOC FOR OPTICAL ENGINEERING, BELLINGHAM, WA, USA, vol. 1380, 7 November 1990 (1990-11-07), pages 238 - 247, XP002434038

- [X] PFEIFFER J ET AL: "DREIDIMENSIONALE OPTISCHE VERMESSUNG VON ZAEHNEN THREE DIMENSIONAL OPTICAL MEASUREMENT OF TEETH", TECHNISCHE MESSEN TM, R.OLDENBOURG VERLAG. MUNCHEN, DE, vol. 63, no. 6, June 1996 (1996-06-01), pages 254 - 261, XP000620449, ISSN: 0171-8096
- [A] VANDRE R H ET AL: "US Army teledentistry", PROCEEDINGS OF THE NATIONAL FORUM: MILITARY TELEMEDICINE ON-LINE TODAY RESEARCH, PRACTICE, AND OPPORTUNITIES IEEE COMPUT. SOC. PRESS LOS ALAMITOS, CA, USA, 1996, pages 53 - 56, XP010165426, ISBN: 0-8186-5860-6
- See references of WO 0184479A1

Citation (examination)

- BATLLE J ET AL: "Recent progress in coded structured light as a technique to solve the correspondence problem - image segmentation techniques", PATTERN RECOGNITION, ELSEVIER, GB, vol. 31, no. 7, 31 July 1998 (1998-07-31), pages 963 - 982, XP004131001, ISSN: 0031-3203, DOI: 10.1016/S0031-3203(97)00074-5
- H. C. LONGUET HIGGINS: "A computer algorithm for reconstructing a scene from two projections", NATURE VOL. 293, 10 September 1981 (1981-09-10) - 10 September 1981 (1981-09-10)
- ZHENGYOU ZHANG ET AL: "A Robust Technique for Matching Two Uncalibrated Images Through the Recovery of the Unknown Epipolar Geometry", INTERNET CITATION, 1 May 1994 (1994-05-01), pages 1 - 42, XP002562691, Retrieved from the Internet <URL:http://hal.archives-ouvertes.fr/inria-00074398/en/> [retrieved on 20100104]

Designated contracting state (EPC)

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

Designated extension state (EPC)

AL LT LV MK RO SI

DOCDB simple family (publication)

WO 0184479 A1 20011108; AU 5160601 A 20011112; EP 1287482 A1 20030305; EP 1287482 A4 20070711; JP 2003532125 A 20031028; JP 2005201896 A 20050728; JP 2005214965 A 20050811; JP 2005230530 A 20050902; JP 4206213 B2 20090107; JP 4989848 B2 20120801; JP 5325366 B2 20131023; JP 5362166 B2 20131211

DOCDB simple family (application)

US 0112107 W 20010413; AU 5160601 A 20010413; EP 01925005 A 20010413; JP 2001581218 A 20010413; JP 2004364269 A 20041216; JP 2004364282 A 20041216; JP 2004364294 A 20041216