(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 January 2007 (04.01.2007)

PCT

(10) International Publication Number
WO 2007/002494 A3

(51) International Patent Classification:
G06K 9/36 (2006.01)

(21) International Application Number:
PCT/US2006/024631

(22) International Filing Date: 23 June 2006 (23.06.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/693,231 23 June 2005 (23.06.2005) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

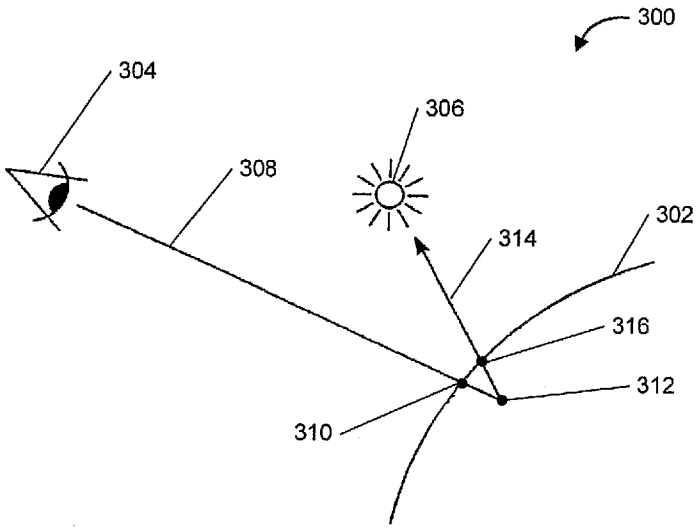
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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:
7 June 2007

[Continued on next page]

(54) Title: REAL-TIME PRECISION RAY TRACING



(57) Abstract: Ray tracing and efficient construction of acceleration data structures required for fast ray-tracing. A computer graphics system generates, for each pixel in an image, a pixel value that is representative of a point in a scene as reported on an image plane of a simulated camera. The computer graphics system is configured to generate the pixel value for an image using a selected ray-tracing methodology. The selected ray-tracing methodology includes the use of a ray tree that includes at least one ray shot from the pixel into a scene along a selected direction. The ray-tracing methodology further includes calculating the intersections of rays and surfaces in the scene. An axis-aligned bounding box is defined that contains, for a given ray, the point of intersection of the ray and the surface nearest the origin of the ray. The bounding box is iteratively refined until a predetermined termination criterion has been met.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 06/24631

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8): G06K 9/36 (2007.01)
USPC: 382/276
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)
USPC: 382/276

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 345/418,419,473,426

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

Electronic data base: USPTO WEST, NPL DialogPRO
Search terms used: computer graphics,ray tracing,scene point,ray tree,camera,ray intersection,bounding volume,bounding box,plane,triangle,tree balancing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,825,839 B2 (HUANG et al.) 30 November 2004 (30.11.2004) [col 2 ln 10,col 3 ln 7,col 13 ln 13-18,col 13 ln 15,col 13 ln 16-17]	1-8,10,14-16,18,19,21-23
A	US 2003/0034968 A1 (ABAMOV et al.) 20 February 2003 (20.02.2003) entire document	1-16,18-23
A	US 6,172,679 B1 (LIM) 09 January 2001 (09.01.2001) entire document	1-16,18-23

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 February 2007 (09.02.2007)	24 APR 2007

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774