



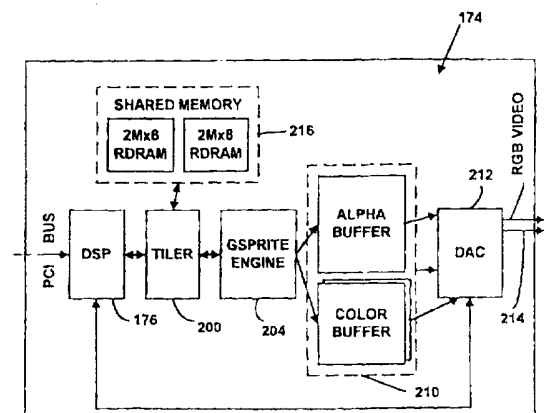
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : G06T 15/00</p>	<p>A3</p>	<p>(11) International Publication Number: WO 97/06512 (43) International Publication Date: 20 February 1997 (20.02.97)</p>																				
<p>(21) International Application Number: PCT/US96/12780 (22) International Filing Date: 2 August 1996 (02.08.96)</p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>08/511,553</td> <td>4 August 1995 (04.08.95)</td> <td>US</td> </tr> <tr> <td>08/560,114</td> <td>17 November 1995 (17.11.95)</td> <td>US</td> </tr> <tr> <td>08/671,412</td> <td>27 June 1996 (27.06.96)</td> <td>US</td> </tr> <tr> <td>08/671,506</td> <td>27 June 1996 (27.06.96)</td> <td>US</td> </tr> <tr> <td>08/672,347</td> <td>27 June 1996 (27.06.96)</td> <td>US</td> </tr> <tr> <td>08/672,425</td> <td>27 June 1996 (27.06.96)</td> <td>US</td> </tr> <tr> <td>08/672,694</td> <td>27 June 1996 (27.06.96)</td> <td>US</td> </tr> </table> <p>(71) Applicant: MICROSOFT CORPORATION [US/US]; One Microsoft Way, Redmond, WA 98052-6399 (US).</p> <p>(72) Inventors: MYHRVOLD, Nathan, P.; 3441 134th Avenue N.E., Bellevue, WA 98005 (US). KAJIYA, James, T.; 31433 N.E. Big Rock Road, Duvall, WS 98019 (US). TORBORG, John, G., jr.; 16407 N.E. 50th Way, Redmond, WA 98052 (US). KENWORTHY, Mark, L.; 30330 N.E. 172nd Street, Duvall, WA 98019-7806 (US). TOELLE, Michael, Allen; 2898 160th Place N.E., Bellevue, WA 98008 (US). GRIFFIN, Kent, E.; 2511 167th Place N.E., Bellevue, WA 98008 (US). LENGYEL, Jerome, Edward; 1808 N. 42nd Street, Seattle, WA 98108 (US). GABRIEL, Steven, A.; Apartment N-372, 17756 N.E. 90th Street, Redmond, WA 98052-3256 (US). VERES, James, E.; 14029 171st Lane N.E., Woodinville, WA 98072 (US). CHAUVIN, Joseph, W.; 24205 S.E. 38th Place, Issaquah, WA 98029 (US). GOOD, Howard; 711 N.E. 43rd Street, Seattle, WA 98105 (US). POWELL, William, Chambers, III; 817 16th Avenue, Seattle, WA 98122 (US).</p>	08/511,553	4 August 1995 (04.08.95)	US	08/560,114	17 November 1995 (17.11.95)	US	08/671,412	27 June 1996 (27.06.96)	US	08/671,506	27 June 1996 (27.06.96)	US	08/672,347	27 June 1996 (27.06.96)	US	08/672,425	27 June 1996 (27.06.96)	US	08/672,694	27 June 1996 (27.06.96)	US	<p>(74) Agent: MEYER, Joel, R.; Klarquist, Sparkman, Campbell, Leigh & Whinston, One World Trade Center, Suite 1600, 121 S.W. Salmon Street, Portland, OR 97204 (US).</p> <p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 19 June 1997 (19.06.97)</p>
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08/672,694	27 June 1996 (27.06.96)	US																				

(54) Title: METHOD AND SYSTEM FOR RENDERING GRAPHICAL OBJECTS TO IMAGE CHUNKS AND COMBINING IMAGE LAYERS INTO A DISPLAY IMAGE

(57) Abstract

To render a display image, the system serially renders chunks of the gsprites, and composites the gsprites to compute a display image. To reduce rendering overhead, the system can perform affine transformations on gsprites to simulate the motion of a 3D object rather than re-rendering the object for frames animation. Rendering geometry in chunks enables sophisticated fragment list anti-aliasing. The system stores fragments representing partially covered pixel locations or translucent pixels in a fragment buffer. After rasterizing primitives for a chunk, a fragment resolution subsystem resolves the fragments to compute output pixels. The rasterizing component of the system attempts to merge fragments to save fragment memory. If the fragment memory is exceeded, the system can subdivide chunks into smaller regions and render these smaller regions independently. The system supports texture accessed in environments with high latency such as in cases where texture data is compressed. The latency of texture accessing is reduced using either a texture reference or "pixel queue" to buffer partially rendered pixel data as texture data is fetched from memory, or using a pre-rasterizer to generate texture requests and a post-rasterizer to rasterize primitives completely using texture data fetched as a result of the texture requests generated by the pre-rasterizer. The system support anisotropic filtering of texture data by repetitively sampling texture data along a line of anisotropy computed for pixel location mapped into a texture or MIP mapped textures.



The system support anisotropic filtering of texture data by repetitively sampling texture data along a line of anisotropy computed for pixel location mapped into a texture or MIP mapped textures.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 96/12780

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 G06T15/00				
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 6 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)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	EUROGRAPHICS '89, 4 - 8 September 1989, AMSTERDAM, pages 209-220, XP000132227 CHAPMAN AND LEWIS: "ADDING PARALLELISM IN OBJECT SPACE TO THE RENDERING PIPE-LINE" see the whole document -----	1, 11, 18		
<input type="checkbox"/> Further documents are listed in the continuation of box C.				
<input type="checkbox"/> Patent family members are listed in annex.				
* Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> </tr> </table>			*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
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			
Date of the actual completion of the international search	Date of mailing of the international search report			
21 November 1996	14. 05. 97			
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 Burgaud, C			

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 96/12780

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see annexed sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-21

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 96/ 12780

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

1. Claims 1-21: Separate rendering of objects.
2. Claims 22-32: Simple affine transformation of sprites when possible.
3. Claims 33-46: Alpha-blending for anti-aliasing.
4. Claims 47-62: Merging pixel fragments.
5. Claims 63-80: Texture mapping.
6. Claims 81-96: Subdividing region comprising too many segments.
7. Claims 97-121: Texture memory access.