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### **Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

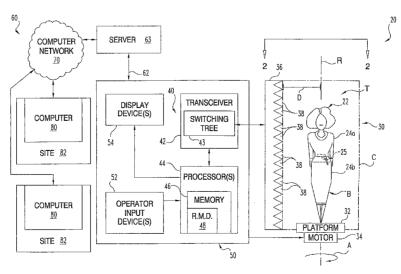
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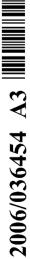
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

 $\textbf{(54) Title:} \ \textbf{THREE-DIMENSIONAL SURFACE/CONTOUR PROCESSING BASED ON ELECTROMAGNETIC RADIATION INTERROGATION \\$ 



(57) Abstract: One embodiment of the present invention includes scanning a target with electromagnetic radiation including one or more frequencies in a range of about 200 MHz to about 1 THz; establishing a point cloud representation of the surface of the target from the scan; and performing one or more curve-fitting operations as a function of at least a portion of the points of the point cloud representation to represent at least a portion of the surface of the target.





### INTERNATIONAL SEARCH REPORT

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|---|---|---|---|----------------------------------|
| A. CLASSIFICATION OF SUBJECT MATTER IPC: G01S 13/88( 2007.01),13/89( 2007.01)   |   |   |   |                                  |
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| B. FIELDS SEARCHED  |   |   |   |                                  |
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| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched   |   |   |   |                                  |
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| C. DOCUMENTS CONSIDERED TO BE RELEVANT  |   |   |   |                                  |
| Category *  | Citation of document, with indication, where appropriate, of the relevant passages  |   |   | Relevant to claim No.            |
| х   | US 6,507,309 B2 (McMakin et al) 14 January 2003 (14.01.2003), column 2, lines 3-14, Figure 6.                                     |   |   | 16, 19                           |
| у   |   |   |   | 10-12, 14, 20                    |
| у   | US 6,253,164 B1 (Rohm et al.) 26 June 2001 (26.06.2001) Column 1, lines 34-57, Abstract.  |   |   | 10-12, 14, 20                    |
| A .   | US 5,081,456 A (Michiguchi et al.) 14 January 1992  | (14.01.1992)  | - 1   | 1-38                             |
| Further   | documents are listed in the continuation of Box C.  | See patent fan  | nily annex.   |                                  |
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|   | 2006 (06.12.2006)   | Authorized officer  | L JAN LUI   | JI                               |
| Mai<br>Com<br>P.O.<br>Alex  | illing address of the ISA/US I Stop PCT, Attn: ISA/US Imissioner for Patents Box 1450 kandria, Virginia 22313-1450 (571) 273-3201 | Authorized officer  Matthew M. Barker  Telephone No. (571) 2  | 72-3103   | /                                |
| orm PCT/ISA/210 (second sheet) (April 2005)   |   |   |   |                                  |