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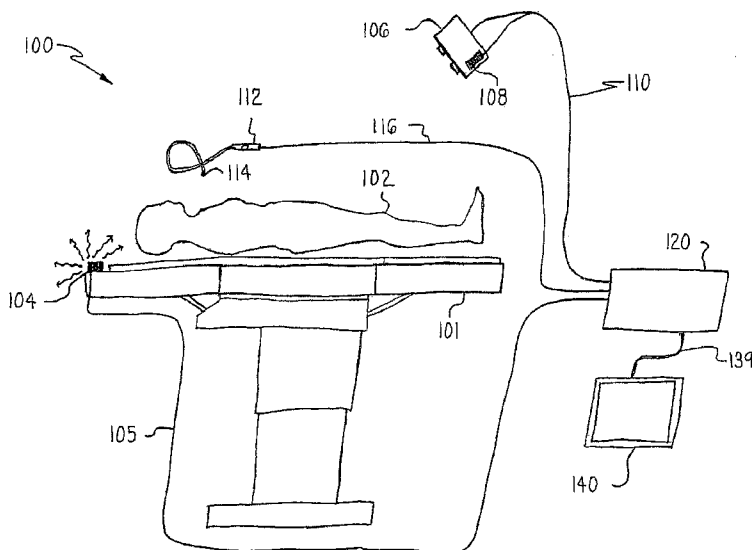
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR 3-D TRACKING OF SURGICAL INSTRUMENT IN RELATION TO PATIENT BODY



(57) Abstract: A system (100) and method for tracking the three-dimensional position and orientation of a surgical instrument as the instrument (112) is being utilized within the interior of a patient body (102). A stereoscopic camera system (106) generates a stereoscopic image of the patient body which is subsequently rendered on a display device (102). A wireless signal transmitted by an electromagnetic field generator (104) is received by a sensor (114) on the surgical instrument (112). Utilizing this sensor data, a processor (120) calculates the position and orientation of the surgical instrument (112) and then superimposes upon the rendered stereoscopic image of the patient body (102) a graphical representation indicative of the position and orientation of the surgical instrument (112).

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
 INV. A61B19/00

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)
 A61B

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 415 609 A (SHERWOOD SERV AG [CH]) 6 May 2004 (2004-05-06)	1, 2, 18-22, 25
Y	paragraph [0050] - paragraph [0054]; figures 1, 5, 8, 9	3, 4, 7, 8, 11-16
Y	----- WO 2004/001569 A2 (CEDARA SOFTWARE CORP [CA]; SATI MARWAN [CA]; CROITORU HANIEL [CA]; TAT) 31 December 2003 (2003-12-31) paragraph [0029]; figure 1	3, 4, 7, 8, 11-16
Y	----- WO 00/69335 A1 (ELBIT SYSTEMS LTD [IL]) 23 November 2000 (2000-11-23) figures 2a, 2b	3, 4, 7, 8, 11-16
Y	----- US 2002/049375 A1 (STROMMER GERA M [IL] ET AL) 25 April 2002 (2002-04-25) paragraphs [0203], [0182]	8
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

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

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International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 519 140 A (GE MED SYS GLOBAL TECH CO LLC [US]) 30 March 2005 (2005-03-30) paragraph [0009] -----	15
Y	WO 2005/087125 A (DEPUY INT LTD [GB]; DEPUY ORTHOPAEDIE GMBH [DE]; BRAINLAB AG [DE]; BIO) 22 September 2005 (2005-09-22) page 13, line 26 - page 14, line 4 -----	16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/007147

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
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.:

see additional sheet(s)

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 7, 8, 11-16, 18-22, 25

A method according to claim 1, wherein the orientation and intensity of an electromagnetic field generated by a generator are detected by two sensors associated with the stereoscopic camera system and with the surgical instrument, respectively (claim 3), and a system to perform said method (claim 11), thereby solving the problem of providing a way of wirelessly tracking the surgical instrument relative to the patient body.

2. claims: 5, 6

A method according to claim 1, wherein the graphical representation of the surgical instrument is selected either by the user (claim 5) or automatically (claim 6), thereby solving the problem of simplifying the method of claim 1 and making it more efficient, since the graphical representation does not have to be generated, but just selected among previously stored data.

3. claims: 9, 10

A method according to claim 1, further comprising the steps of transmitting a time encoded wireless signal from each of three wireless transmitters having a known 3D position, said signal being detected by two receivers associated with the stereoscopic camera system and with the surgical instrument, respectively (claim 9), thereby solving the problem of providing an alternative way of wirelessly tracking the surgical instrument relative to the patient body.

4. claim: 17

A navigation system comprising one surgical instrument, means for projecting a pattern of light upon the patient body, one EMF generator, one EMF sensor mounted upon the surgical instrument, one EMF sensor mounted upon the projecting means and a processor, thereby solving the problem of providing an alternative way of visually indicating the position of the surgical instrument within the patient body, without the need of an additional display.

5. claims: 23, 24

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A method according to claim 18, further comprising the step of mounting the stereoscopic camera on a body of a person as one of eyewear and headwear (claim 23), thereby solving the problem of allowing the surgeon to obtain stereoscopic images of the patient body from numerous perspectives.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2007/007147

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