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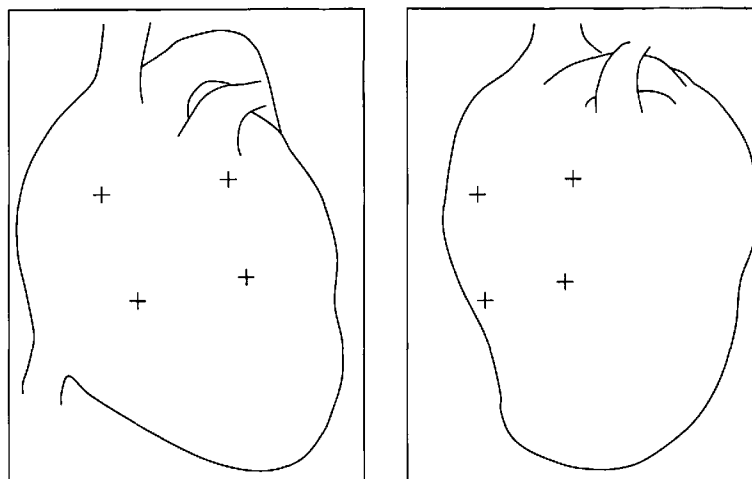
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(54) Title: SURGICAL NAVIGATION AND LOCALIZATION SYSTEM UTILIZING SCALE-INVARIANT REGISTRATION



(57) Abstract: A system for navigating a medical device through the lumens and cavities in an operating region in a subject, comprising an imaging system for displaying an image of the operating region, including a representation of the distal end of the medical device in the operating region. The system also includes a localization system for determining the position of the medical device in a frame of reference translatable to the displayed image. Finally, the system includes an algorithm for evaluating one or more rotation matrix using a cost function to determine an optimum rotation matrix for performing transformation of a vector in the local frame of the localization system to that of the reference frame of the navigation system. The rotation matrix can then provide a scale invariant transformation or "registration" of the coordinate systems of the localization system and the navigation system.. This allows navigation to be performed to a significant extent from the localization system display alone, which avoids the frequent x-ray irradiation that occurs during the use of fluoro imaging for navigation purposes.

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INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC: A61B 5/05(2006.01)

USPC: 600/424
 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)
 U.S. : 600/424

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 practicable, 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.
X --- Y	US 6,332,089 B1 (ACKER et al) 18 December 2001 (18.12.2001), see entire reference	1-9,17,23-30,32-42,44-46 ----- 1-46
Y	US 6,774,624 B2 (ANDERSON et al) 10 August 2004 (10.08.2004), columns 13-16	10,13,31,43
Y,P	US 2004/0176931 A1 (WRIGHT et al) 09 September 2004 (09.09.2004), paragraphs 16 and 18	10-12,14-16,18-22

Further documents are listed in the continuation of Box C. See patent family annex.

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Continuation of Item 4 of the first sheet:

SURGICAL NAVIGATION AND LOCALIZATION SYSTEM UTILIZING SCALE-INVARIANT REGISTRATION