



- (51) International Patent Classification:  
A61B 5/00 (2006.01)
- (21) International Application Number:  
PCT/IL2013/050438
- (22) International Filing Date:  
21 May 2013 (21.05.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/688,730 21 May 2012 (21.05.2012) US  
61/761,709 7 February 2013 (07.02.2013) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:  
US 13/228,229 (CIP)  
Filed on 8 September 2011 (08.09.2011)  
US 12/666,879 (CIP)  
Filed on 28 December 2009 (28.12.2009)

Eldad [IL/IL]; 25 Hahistadrut Street, 46420 Herzlia (IL). COHEN, Ran [IL/IL]; 28/13 Hadera Street, 49726 Petach Tikva (IL). TOLKOWSKY, David [IL/IL]; 3/84 Rav Ashi Street, 69395 Tel Aviv (IL). BARZELAY, Zohar [IL/IL]; 52 Abba Hillel Silver Street, 32694 Haifa (IL).

(74) Agents: SANFORD T. COLB & CO. et al.; P.O. Box 2273, 76122 Rehovot (IL).

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

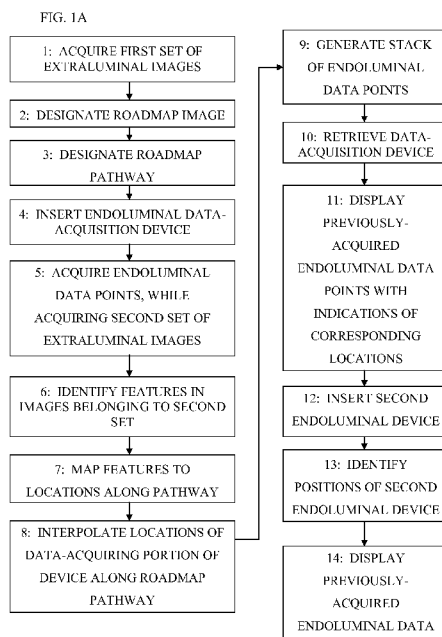
(71) Applicant: SYNC-RX, LTD. [IL/IL]; 8 HaMelacha Street, P.O. Box 8072, 42505 Netanya (IL).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

(72) Inventors; and  
(71) Applicants : STEINBERG, Alexander [IL/IL]; 20/5 Eliezer Yaffe Street, 43452 Ra'anana (IL). KLAIMAN,

[Continued on next page]

(54) Title: CO-USE OF ENDOLUMINAL DATA AND EXTRALUMINAL IMAGING



(57) Abstract: Apparatus and methods are described including a processor (20) configured to receive first and second sets of extraluminal images of a lumen, the second set being acquired while an endoluminal device is being moved through the lumen. The processor designates at least one of the first set of images as a roadmap image, and designates, within the lumen in the roadmap image, a roadmap pathway (42). A plurality of features (44, 46, 48, 50) that are visible within at least some of the second set of extraluminal images are identified, and an arrangement of three or more of the features within the image are compared to a shape of at least a portion of the roadmap pathway. Based upon the comparing, the identified features are mapped to locations along the roadmap pathway within the roadmap image. Other applications are also described.

WO 2013/175472 A3

MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, (88) Date of publication of the international search report:  
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, 27 February 2014  
GW, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report (Art. 21(3))

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL2013/050438

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61B 5/00 (2013.01)

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)

IPC(8) - A61B 5/00, 5/05, 5/1495 (2013.01)

USPC - 600/300, 407, 424

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

CPC - A61B 5/00, 5/05, 5/1495 (2013.01)

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

Orbit, Google Patents, Google Scholar

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2012/014212 A2 (TOLKOWSKY et al) 02 February 2012 (02.02.2012) entire document	1,9-18, 26-34, 75-102
Y		2-8, 19-25, 35-74
Y	US 2010/0191102 A1 (STEINBERG et al) 29 July 2010 (20.07.2010) entire document	2-4, 19-21
Y	US 2006/0149134 A1 (SOPER et al) 06 July 2006 (06.07.2006) entire document	5-8, 22-25, 35-74
A	US 2011/0118825 A1 (HUNTER et al) 19 May 2011 (19.05.2011) entire document	1-102

 Further documents are listed in the continuation of Box C.

## \* 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 application or patent 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

20 November 2013

Date of mailing of the international search report

02 DEC 2013

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774

## INTERNATIONAL SEARCH REPORT

PCT/IL2013/050438  
International application No.

PCT/IL2013/050438

**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 extra 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 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.:  
1-102

**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.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-102, are drawn to an apparatus and method for use with an endoluminal device.

Group II, claims 103-208, are drawn to an apparatus and method for use with an endoluminal data-acquisition device.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical features of Group I, a first set of extraluminal images of a lumen, a second set of extraluminal images of an endoluminal device inside the lumen, designating the first set of images as a roadmap image, and identifying within the second set of images a plurality of features that are visible within the image, comparing the features within the image to a shape of at least a portion of the roadmap pathway, are not present in Group II; and, the special technical features of Group II, a method of acquiring endoluminal data points, and stack-generation functionality configured to generate a stack of the endoluminal data points, are not present in Group I.

Groups I and II share the technical features of an endoluminal device configured to be moved through a lumen of a subject, at least one processor, and a display to display output functionality. However, these shared technical features do not represent a contribution over the prior art. Specifically, US 2010/0191102 A1 to Steinberg et al. teaches of an endoluminal device (Para. [0641] regarding endoluminal imaging catheter) configured to be moved through a lumen of a subject (Para. [0641] regarding endoluminal imaging catheter; Abstract regarding while the tool is inside the blood vessel), at least one processor (Paras. [0546], [0639] regarding processor), and a display to display output functionality (Paras. [0482]-[0487]; Para. [0641] regarding displayed).

Since none of the special technical features of the Group I and II inventions are found in more than one of the inventions, unity of invention is lacking.