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- (71) Applicant: **MEDTRONIC NAVIGATION, INC.**
[US/US]; 826 Coal Creek Circle, Coal Creek Corporate
Center One, Louisville, Colorado 80027 (US).
- (72) Inventors: **KEMP, Justin**; 2303 Holly Drive, Erie, Col-
orado 80516 (US). **PAITEL, Yvan**; 801 Garfield Avenue,
Louisville, Colorado 80027 (US). **WALD, Andrew**; 891
14th St., #1203, Denver, Colorado 80202 (US). **BEGIN,
Trent**; 1903 Pine Street, Boulder, Colorado 80302 (US).
MAHENDRA, Nikhil; 12440 Vrain Circle, Broomfield,
Colorado 80020 (US).
- (74) Agent: **WARNER, Richard W.** et al.; Harness, Dickey &
Pierce, P.L.C., P. O. Box 828, Bloomfield Hills, Michigan
48303 (US).
- (81) Designated States (*unless otherwise indicated, for every
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AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
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HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
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MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
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(54) Title: SYSTEM AND METHOD FOR A TRACKED PROCEDURE

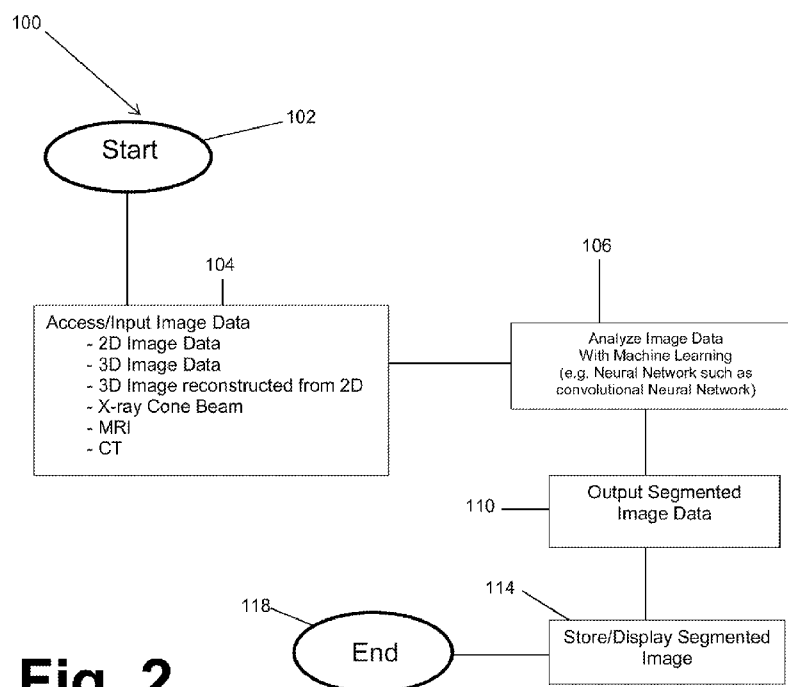


Fig. 2

(57) Abstract: Disclosed is a navigation system. The navigation system may be used to at least assist in a procedure. The system may assist in delineating objects and/or determining physical boundaries of image elements. The system may assist in planning and/or a workflow of the procedure.

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

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))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. G16H20/40 G16H30/40
ADD.

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)
G16H

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2017/112575 A1 (LI MINGZHONG [US] ET AL) 27 April 2017 (2017-04-27) whole document, in particular [0022],[0024],[0025],[0019], [0027], [0036],[0044] fig. 2, claims 1 and 5 -----	1-18
Y	US 2018/092699 A1 (FINLEY ERIC [US]) 5 April 2018 (2018-04-05) whole doc, in particular claim 15, [0109]-[0112], fig. 15, 16A-C, 28, 31 -----	1-18
Y	WO 00/56215 A1 (SURGICAL NAVIGATION TECH [US]) 28 September 2000 (2000-09-28) whole document, in a particular fig's ----- -/-	1-18



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 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

9 October 2019

Date of mailing of the international search report

18/10/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Lüdemann, Susanna

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2019/029158

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	C. CERNAZANU-GLAVAN ET AL: "Segmentation of Bone Structure in X-ray Images using Convolutional Neural Network", ADVANCES IN ELECTRICAL AND COMPUTER ENGINEERING, vol. 13, no. 1, 1 January 2013 (2013-01-01), pages 87-94, XP055446296, RO ISSN: 1582-7445, DOI: 10.4316/AECE.2013.01015 abstract and fig. 1,3,4-6 -----	1-18
Y	ÇIÇEK ÖZGÜN ET AL: "3D U-Net: Learning Dense Volumetric Segmentation from Sparse Annotation", 2 October 2016 (2016-10-02), INTERNATIONAL CONFERENCE ON COMPUTER ANALYSIS OF IMAGES AND PATTERNS. CAIP 2017: COMPUTER ANALYSIS OF IMAGES AND PATTERNS; [LECTURE NOTES IN COMPUTER SCIENCE; LECT.NOTES COMPUTER], SPRINGER, BERLIN, HEIDELBERG, PAGE(S) 424 - 432, XP047392527, ISBN: 978-3-642-17318-9 [retrieved on 2016-10-02] the whole document -----	1-18
X,P	EP 3 443 888 A1 (HOLO SURGICAL INC [US]) 20 February 2019 (2019-02-20) the whole document -----	1-18
X,P	EP 3 470 006 A1 (HOLO SURGICAL INC [US]) 17 April 2019 (2019-04-17) the whole document -----	1-18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2019/029158

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.: 19-37
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:
see FURTHER INFORMATION sheet PCT/ISA/210
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:

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 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.:

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

Continuation of Box II.2

Claims Nos.: 19-37

The present application contains 37 claims, of which 3 are independent. There is no clear distinction between the independent claims because of overlapping scope. The claims are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25).

Claim 29 referring to a further surgical navigation system lacks the feature of the convolutional neural network (CNN) with respect to claim 1, while claim 30 which relates a method of using a surgical navigation system lacks the feature in that CNN is based on a segment of a spinal vertebrae.

The search was based on the subject-matter that, as far as can be understood, could reasonably be expected to be claimed later in the procedure, and the corresponding claims, namely 1-18.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/029158

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2017112575	A1	27-04-2017	NONE
US 2018092699	A1	05-04-2018	AU 2017340607 A1 02-05-2019 CN 109952070 A 28-06-2019 EP 3375399 A2 19-09-2018 US 2018092699 A1 05-04-2018 WO 2018067794 A1 12-04-2018
WO 0056215	A1	28-09-2000	AU 3902400 A 09-10-2000 DE 60032475 T2 27-09-2007 EP 1178755 A1 13-02-2002 EP 1757228 A1 28-02-2007 EP 2356940 A1 17-08-2011 US 6470207 B1 22-10-2002 US 2003073901 A1 17-04-2003 US 2010041985 A1 18-02-2010 US 2011268248 A1 03-11-2011 WO 0056215 A1 28-09-2000
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EP 3470006	A1	17-04-2019	EP 3470006 A1 17-04-2019 US 2019105009 A1 11-04-2019