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## Published:

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[Continued on next page]

(54) Title: HYPERSPECTRAL DETECTOR SYSTEMS AND METHODS USING CONTEXT-IMAGE FUSION

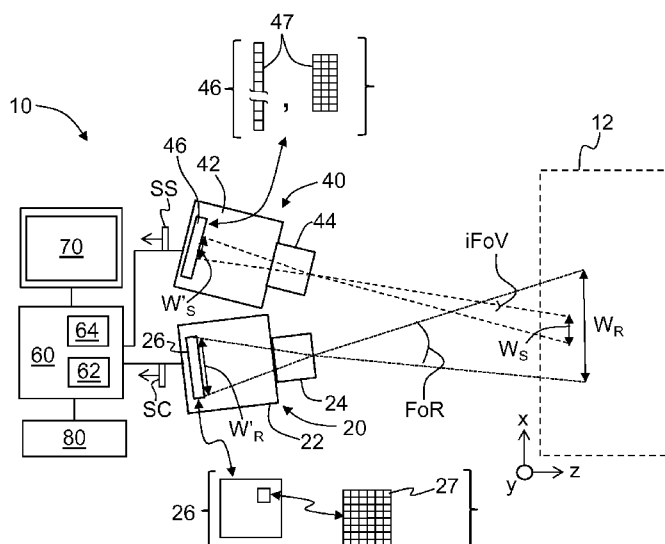


FIG. 1

(57) Abstract: Hyperspectral detector systems and methods for spectrally analyzing a scene are disclosed. The methods include capturing a context image and a single-column spectral image that falls within the context image. The spectral image is panned over the scene and within the context image to capture spectral signatures within the scene. The spectral signatures are compared to reference spectral signatures, and the locations of the one or more spectral signatures are marked. The systems and methods obviate the need to store and process large amounts of spectral data and allow for real-time display of the fused context image and spectral image, along with the marked locations of matched spectral signatures.



— *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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2 July 2015

## INTERNATIONAL SEARCH REPORT

International application No  
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## A. CLASSIFICATION OF SUBJECT MATTER

INV. G01J3/28 G01J3/02 G01J3/36 H04N5/232 G01C11/02  
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)

G01J H04N G01C

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.
X	US 2008/297587 A1 (KURTZ ANDREW F [US] ET AL) 4 December 2008 (2008-12-04) paragraphs [0005], [0019], [0042] - [0071], [0125]; figures 1,3a,4a,4b -----	1,2,6-8, 14-20
A	US 7 058 209 B2 (CHEN SHOUPU [US] ET AL) 6 June 2006 (2006-06-06) column 5, lines 22-64; figures 3,8 ----- -/--	1-9, 14-20



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

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"&" document member of the same patent family

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Name and mailing address of the ISA/

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/056270

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HEALEY G ET AL: "Face recognition in hyperspectral images", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE COMPUTER SOCIETY, USA, vol. 25, no. 12, 1 December 2003 (2003-12-01), pages 1552-1560, XP011103923, ISSN: 0162-8828, DOI: 10.1109/TPAMI.2003.1251148 section 1 - Introduction, section2; page 1552 - page 1554 -----	1,14
X	US 2010/013927 A1 (NIXON STUART WILLIAM [AU]) 21 January 2010 (2010-01-21) paragraphs [0029], [0038], [0057]; figures 2B,3 -----	1-9, 14-20
X	US 5 124 915 A (KRENZEL ARTHUR [US]) 23 June 1992 (1992-06-23) column 2, lines 3-14; figure 1 column 2, line 32 - column 3, line 20 column 4, line 37 - line 58 -----	10-13
A	JRGEN WOHLFEIL: "Determining fast orientation changes of multi-spectral line cameras from the primary images", ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING, AMSTERDAM [U.A.] : ELSEVIER, AMSTERDAM, NL, vol. 67, 7 October 2011 (2011-10-07), pages 45-51, XP028444414, ISSN: 0924-2716, DOI: 10.1016/J.ISPRSJPRS.2011.10.004 [retrieved on 2011-10-18] section 1, 1 -----	1-13
A	EP 0 326 128 A2 (DEUTSCHE FORSCH LUFT RAUMFAHRT [DE]; BRAEUMER BURKHARD INGBUERO [DE] D) 2 August 1989 (1989-08-02) column 3, lines 29-54; figure 1 -----	10-13

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2014/056270

## 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 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**

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

1. claims: 1-9, 14-20

2D-array detectors

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2. claims: 10-13

Scanned pixel line

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/056270

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008297587 A1	04-12-2008	US 2008297587 A1 WO 2008150427 A1	04-12-2008 11-12-2008
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