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- (71) Applicant: **PLACEMETER INC.** [US/US]; 425 Broadway, 4th Floor, New York, NY 10013 (US).
- (72) Inventors: **WINTER, Alexandre**; 425 Broadway, 4th Floor, New York, NY 10013 (US). **HALDIMANN, Niklaus**; 425 Broadway, 4th Floor, New York, NY 10013 (US). **THI, Tuan Hue**; 425 Broadway, 4th Floor, New York, NY 10013 (US).
- (74) Agent: **COURTNEY, Barbara B.**; Courtney IP Law, P.O.Box 9847, San Jose, CA 95157 (US).
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(54) Title: SYSTEM AND METHOD FOR ACTIVITY MONITORING USING VIDEO DATA

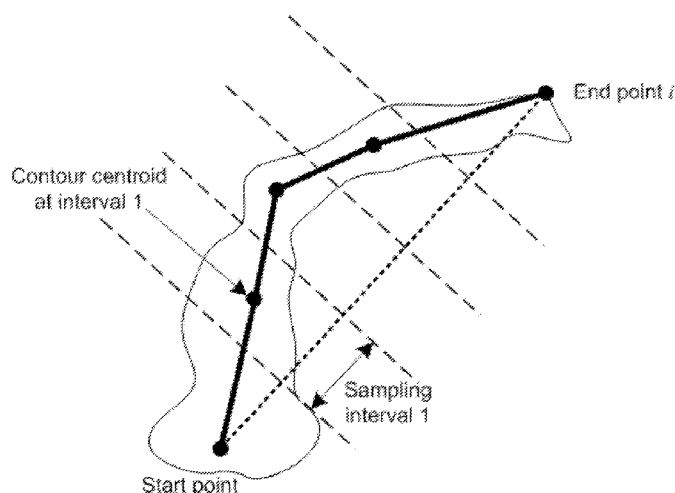


FIG. 6

(57) Abstract: Embodiments of a method and system described herein enable capture of video data streams from multiple, different devices and the processing of the video data streams. The video data streams are merged such that various data protocols can all be processed with the same worker processors on different types of operating systems, which are typically distributed. An embodiment uses a mobile device (such as a mobile phone) as a device and deploys a video sensor application on the mobile device for encoding consecutive video files, time stamping the consecutive video files, and pushing the consecutive video files to a file server to produce a stable stream of video data. Thus avoiding the inefficiencies associated with having video processing in the data flow loop.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/33499

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04L 29/04 (2015.01)

CPC - H04L 62/025; H04N 7/181; H04N 7/185; G06F 17/30017; G06F 17/30823; H04L 65/60

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)

CPC - H04L 62/025; H04N 7/181; H04N 7/185; G06F 17/30017; G06F 17/30823; H04L 65/60

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
USPC - 375/240.0; 348/134

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

Database Used: PatBase, Google Patents, Google Web, Google Scholar

Search Term Used : video analysis, worker processes, management subsystem, special purpose, processor, different types, mobile device, video stream, subsystem, realtime, moving object, background, server, stream

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category*     | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                      | Relevant to claim No. |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X<br>---<br>Y | US 8,369,399 B2 (Egnal et al.) 05 February 2013 (05.02.2013); entire document, especially abstract; col 2, ln 43-46; col 5, ln 28-49; col 3, ln 4; col 4, ln 21-42; col 2, ln 12-31; col 7, ln 54-60; col 14, ln 23-25. | 1-6<br>-----<br>7-10  |
| Y             | US 7,221,367 B2 (Cardno) 22 May 2007 (22.05.2007); entire document, especially abstract; col 4, ln 8-33-col 5, ln 50-56; col 7, ln 61-67.                                                                               | 7-10                  |
| A             | US 8,331,619 B2 (Ikenoue) 11 December 2012 (11.12.2012); entire document.                                                                                                                                               | 1-10                  |
| A             | US 7,688,349 B2 (Flickner et al.) 30 March 2010 (30.03.2010); entire document.                                                                                                                                          | 1-10                  |
| A             | US 2014/0036090 A1 (Black et al.) 06 February 2014 (06.02.2014); entire document.                                                                                                                                       | 1-10                  |
| A             | US 8,340,654 B2 (Bratton et al.) 25 December 2012 (25.12.2012); entire document.                                                                                                                                        | 1-10                  |

☐ 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

29 September 2015 (29.09.2015)

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Name and mailing address of the ISA/US

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P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-8300

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300  
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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/33499

## 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:  
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 1-10: drawn to a system for activity monitoring using video data.

Group II: claims 11-15: drawn to a video data processing method for encoding and time stamping consecutive video files.

Group III: claims 16-20: drawn to a computer-readable medium implementing a video processing method for detecting moving objects in a video stream, classifying the objects, and tracking their trajectory over time.

-See Continuation 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.:  
1-10

### 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.

Continuation of:

Box III Observations where unity of invention is lacking

The inventions listed as Groups I-III 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:

Special technical features:

Group I requires a management subsystem, not found in the other groups.

Group II requires a video sensor application that performs various functions using the mobile device, the function comprising: encoding consecutive video files; time stamping the consecutive video files; and pushing the consecutive video files to a file server to produce a stable stream of video data.

Group III requires detecting moving objects based on estimating a background image of a fixed video stream; classify the moving objects as one of "known object" and noise; and track a trajectory of one object over time.

Shared Features:

The only technical features shared by Groups I-III that would otherwise unify the groups are at least one special purpose processor for performing a plurality of video analysis worker processes and a plurality of video data sources of multiple types producing video data of different types, wherein the plurality of video data sources comprises at least one mobile device executing a video sensing application that produces a video stream for processing by the video analysis worker processes.

The only additional technical features shared by Groups II and III that would otherwise unify the groups are the worker processes that operate on the video data streams to generate processed video data that includes real time information related to scenes.

However, these shared technical features do not represent a contribution over prior art, because the shared technical features are anticipated by US 8,369,399 B2 to Egnal et al. (hereinafter 'Egnal') 05 February 2013 (05.02.2013), which discloses an activity monitoring system and method which includes at least one special purpose processor for performing a plurality of video analysis worker processes and a plurality of video data sources of multiple types producing video data of different types (col 2, ln 59 to col 3, ln 4, col 4, ln 21-42), wherein the plurality of video data sources comprises at least one mobile device (col 2, ln 12-31) executing a video sensing application that produces a video stream for processing by the video analysis worker processes and wherein the worker processes that operate on the video data streams to generate processed video data that includes real time information related to scenes (Abstract, col 2, ln 12-31, Methods and systems for combining multiple video streams are provided. In an embodiment, video feeds are received from multiple optical sensors, such as a camera array. .... To create the composite video, homography information and/or corner metadata is calculated for each frame from each video stream.... Local translation of each image may also be used to synchronize the video frames. Sensor movement may be accounted for by indentifying a feature that occurs in successive video frames and suing the predicted movement of the feature to compensate for extraneous motion. In an embodiment, the optical sensors are provided by a mobile platform, which may be airborne, such as a manned or unmanned surveillance vehicle. Image data can be requested from a ground operator, and transmitted from the airborne platform to the user in real time or at a later time.).

As the shared technical features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Groups I-III therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.