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[US/US]; 425 Brighton Street #403, Bethlehem, PA 18015 (US).

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(74) Agents: CASEY, Kevin, R. et al.; Ratner & Prestia, 301 One Westlakes (Berwyn), P.O. Box 980, Valley Forge, PA 19482-0980 (US).

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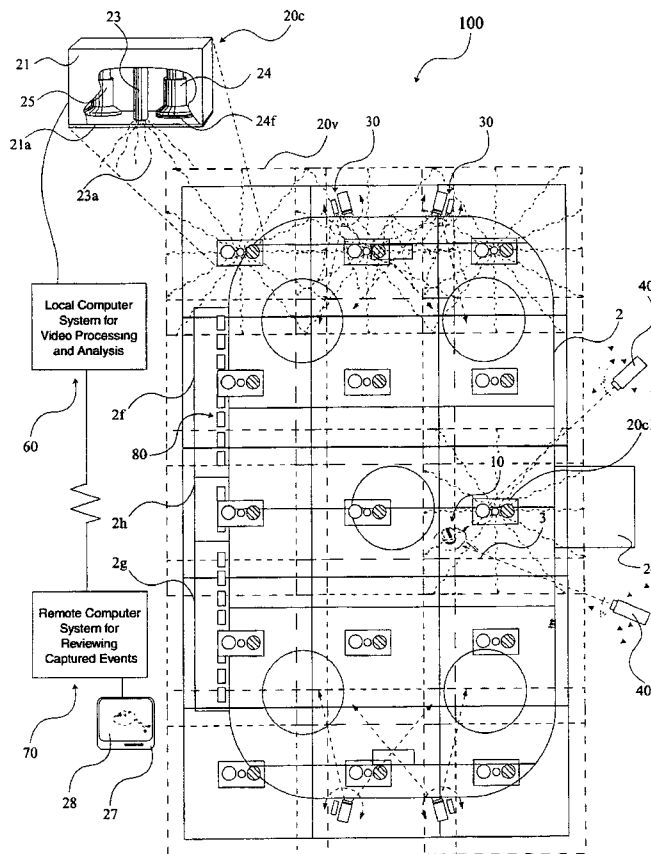
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(71) Applicants and
(72) Inventors: AMAN, James, A. [US/US]; 134 Bridle View Way, Souderton, PA 18964 (US). HALLER, William, R.

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[Continued on next page]

(54) Title: MULTIPLE OBJECT TRACKING SYSTEM



(57) Abstract: A system (100) for tracking the movement of multiple objects within a predefined area using a combination of overhead X-Y filming cameras (25) and tracking cameras (24) with attached frequency selective filter (24f). Also employed are perspective Z filming cameras (25) and tracking (24) cameras with filter (24f). Objects to be tracked have been marked with a frequency selective reflective material, such as patches (7r and 71), sticker (9) and tape (4a). System (100) radiates selected energy (23a) throughout the area of tracking to reflect off said reflective materials. Reflected energy such as (7m, 9a and 4b) is then received by tracking cameras (24) while all other ambient light is blocked by filter (24f). Local Computer System (60) captures images from tracking cameras (24) and locates said markings. Using said location information along with preknowledge concerning said multiple objects maximum rate of speed and maximum size as well as calculated movement information, system (60) is able to extract the background of the unfiltered images (25) that represent said multiple objects.

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MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(15) Information about Correction:

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/27281

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A63B71/06 G01S17/87 G01S17/66 H04N5/262 G06T7/00

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 7 G01S A63B H04N G06T

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 practical, 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 | EP 0 813 040 A (XEROX CORP) 17 December 1997 (1997-12-17) | 1,5 |
| Y | column 2, line 39 - line 48 column 3, line 3 - line 22 column 3, line 43 - line 51 column 6, line 7 - line 13 column 6, line 53 - column 7, line 6 column 8, line 5 - column 9, line 10 | 2,4,6 |
| X | WO 95 10915 A (ORAD INC) 20 April 1995 (1995-04-20) abstract; figure 3A page 15, line 30 - line 36 page 19, line 8 - line 22 page 20, line 33 - page 21, line 16 page 23, line 29 - line 34 | 3 |
| | --- -/-- | |

Further documents are listed in the continuation of box C.

Patent family members are listed in 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 document 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

19 June 2000

Date of mailing of the international search report

- 5. 07. 2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Niemeijer, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/27281

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|--|-----------------------|
| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | US 5 617 335 A (HASHIMA MASAYOSHI ET AL) 1 April 1997 (1997-04-01) cited in the application | 5 |
| A | abstract; figure | 1,2 |
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| Y | WO 97 02699 A (FOX SPORTS PRODUCTIONS INC) 23 January 1997 (1997-01-23) | 2,6 |
| A | abstract; figures 1,32 page 18, line 10 - line 24 page 21, line 20 -page 22, line 22 page 30, line 23 - line 29 page 35, line 5 - line 16 page 59, line 6 -page 60, line 29 | 1,5 |
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| Y | FR 2 726 370 A (VALLORTIGARA ALAIN) 3 May 1996 (1996-05-03) abstract | 4 |
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| A | US 4 764 668 A (HAYARD MICHEL) 16 August 1988 (1988-08-16) abstract; figure 2 | 1,5 |
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/27281

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 fee, this Authority did not invite payment of any additional fee.
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.
- 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: 1,2,5

Extracting image of object from its background using special markers

2. Claim : 3

Minimising field of view for tracking

3. Claim : 4

Storing of positional data in a database

4. Claim : 6

Extracting moving object from matching images using dual cameras

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/27281

| Patent document cited in search report | A | Publication date | Patent family member(s) | Publication date |
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