



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.10.2007 Bulletin 2007/40

(51) Int Cl.:
G08B 13/196 (2006.01)

(21) Application number: **06006335.1**

(22) Date of filing: **28.03.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Sunvision Scientific Inc.**
Industrial Park
Taichung City 407 (TW)

(72) Inventors:
• **Chang, Chao-Hung**
Taichung City 407 (TW)
• **Chang, Chow-Ing**
Taichung City 407 (TW)
• **Chang, Tain-Tzu**
Taichung City 407 (TW)

(74) Representative: **Negrini, Elena**
Agazzani & Associati S.r.l.
Via dell'Angelo Custode 11/6
40141 Bologna (IT)

(54) **Object detection system and method**

(57) An object detection system and method is applied to an active surveillance system for detecting at least one target object appeared in an area of interest. The object detection system includes a processor for defining the area of interest into at least a first and a second zone; a controller for assigning a first and a second weight to the first and the second zone, respectively, wherein the first weight is higher than the second weight; and a

first image capturing device for capturing an image of the target object appeared in the first zone prior to capturing an image of the target object appeared in the second zone. With these arrangements, the detection of at least one target object appeared in more than one zone having a specific weight assigned thereto may be implemented with improved efficiency and accuracy in object selection and reduced interferences from environmental variables.

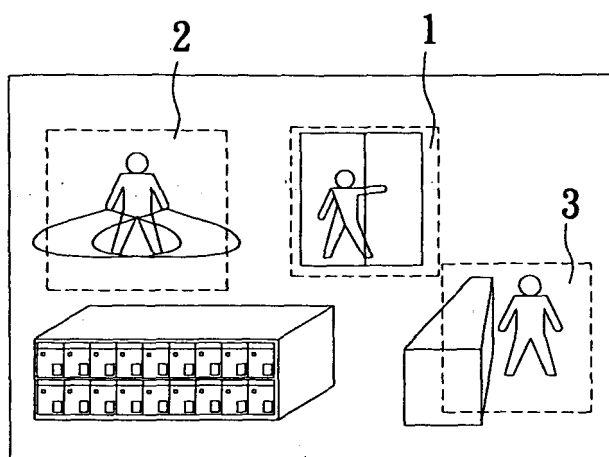


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to an object detection system and method for applying to an active surveillance system, so that the detection of at least one target object appeared in more than one zone each having a specific weight assigned in order to improve the efficiency and accuracy of target objects selection and reduced interferences from environmental variables.

BACKGROUND OF THE INVENTION

[0002] Most of currently available security surveillance systems have the problems of low image resolution and relatively small target size. The low image resolution results in unclear images that is unidentifiable and could not be effectively improved even through digital image processing. To solve these problems existing in the conventional security surveillance systems, there is development of Automatic Target Tracking System, in which a first image-capturing device is used to get a full-scene image, from which a target object is located through image comparison using a processor; and then, a second image-capturing device is driven to get a local image of target area, so as to effectively obtain the target object image with much improved quality. While the above-described Automatic Target Tracking System effectively improves the image quality, it has many other problems in the practical use. For instance, in the full-scene image, targets such as people, cars, and the like in different zones have different degrees of importance; swaying trees, flags, shadows, etc. form external environmental interferences; and targets are located at different distances from the image-capturing device. In brief, there are complicate background and multiple targets included in the full-scene image at the same time. Moreover, the current image processing technique does not ensure capturing the most important target object.

[0003] Another problem with the conventional security surveillance systems is that all the image data stored are full-scene image data, which is very big in volume and adversely shortens the recording time available from one storage device. Currently, a common way to extend the surveillance recording time is to use black-white and/or decrease resolution.

[0004] Therefore, it is an important issue to provide a target object detection system and method that is able to effectively locate the target object of interest and determine the degree of importance, and therefore improve the recording quality and efficiency of the surveillance system.

SUMMARY OF THE INVENTION

[0005] A primary objective of the present invention is to provide an object detection system and method, which

is applied to an active surveillance system to enable detection of at least one target object, appeared in more than one zone, each of which has a specific weight assigned thereto, with improved efficiency and accuracy in target selection and reduced interferences from environmental variables.

[0006] Another objective of the present invention is to provide an object detection system and method, which is able to capture and magnify the image of a specified target, so as to present a high-quality clear image.

[0007] A further objective of the present invention is to provide an object detection system and method, which is able to process a captured image for a background portion of the image to have a low image resolution and target object portions of the image to have a high image resolution, so that the memory space needed to store the captured image can be reduced.

[0008] To achieve the above and other objectives, the object detection system according to the present invention for applying to an active surveillance system to detect at least one target object appeared in an area of interest includes a processor for defining the area of interest into at least a first and a second zone; a controller for assigning a first weight to the first zone and a second weight to the second zone, wherein the first weight is higher than the second weight; and a first image capturing device for capturing an image of a target object appeared in the first zone prior to capturing an image of the target object appeared in the second zone.

[0009] With these arrangements, the active surveillance system is able to detect at least one target object in more than one zone, each of which is assigned a specific weight, with improved efficiency and accuracy of target selection and reduced interferences from environmental variables.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The structure and the technical means adopted by the present invention to achieve the above and other objectives can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein

Fig. 1 shows a first example of application of a first embodiment of the present invention;

Figs. 2 and 3 show a second example of application of the first embodiment of the present invention;

Figs. 4 and 5 show a third example of application of the first embodiment of the present invention;

Fig. 6 shows a fourth example of application of the first embodiment of the present invention;

Figs. 7 and 8 show an example of application of a second embodiment of the present invention;

Figs. 9 and 10 show an example of application of a third embodiment of the present invention; and

Fig. 11 shows an example of application of a fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] An object detection system and method according to the present invention is used to detect at least one target object appeared in an area of interest. In a first embodiment of the present invention, there is included a processor for defining the area of interest into at least a first and a second zone, and the sizes and locations of the first and the second zone can be changed at a predetermined time cycle; a controller for assigning a first weight to the first zone and a second weight to the second zone, and the first and the second weight can also be changed at a predetermined time cycle, wherein the first weight is higher than the second weight, and values of the first and the second weight can be successively gradually increased in at least one predetermined direction in the area of interest; and a first image capturing device for capturing an image of a target object appeared in the first zone prior to capturing an image of the target object appeared in the second zone. The object detection system may optionally include a second image capturing device for capturing a full-scene image of the area of interest, wherein the first image capturing device has a smaller angle of view than that of the second image capturing device.

[0012] Please refer to Fig. 1 that shows a first example of application of the object detection system according to the first embodiment of present invention to a surveillance system in a convenient store. In this case, an inner space of the convenient store is divided into a first, a second, and a third zone 1, 2, and 3, corresponding to an entrance area, a merchandise display area, and a check-out stand area, respectively. Any moving objects in the store, for example, are selected as targets to be monitored. And, different weights are assigned to the three zones. More specifically, the first zone 1 is assigned a weight higher than that assigned to the second zone 2, and the second zone 2 is assigned a weight higher than that assigned to the third zone 3. The image capturing device would first capture the target images in the zone having the highest weight. Whereby when there are targets appeared in all the three zones 1, 2, and 3 at the same time, it is ensured images of the targets in the most important zone with the highest weight are always captured at the first priority.

[0013] For example, the first image capturing device would, in the first priority, capture the images of persons passing through the first zone 1, that is, the entrance area. When a predetermined time period lapsed and there is no target object appeared in the first zone 1 during this time period, the first image capturing device would

then switch to the second zone 2, that is, the merchandise display area, to capture in the first priority the images of persons appeared in the second zone 2. Similarly, only when there is no target object appeared in the first and the second zone 1, 2 over a predetermined time period, the first image capturing device would switch to the third zone 3 to capture the images of targets appeared therein.

[0014] Please refer to Figs. 2 and 3 that show a second example of application of the object detection system according to the first embodiment of the present invention in tracking outdoor targets. In this case, the target selection by the image capturing device is most frequently affected by trees swaying in the wind and tree shadows that change in length and location with the moving sun. To avoid these unfavorable factors, the object detection system of the present invention is able to assign a lower or zero weight to the areas with fixed trees 4 and the areas with time-changing shadows 5 to minimize the interferences from external environment to improve the accuracy and efficiency of target selection.

[0015] Figs. 4 and 5 show a third example of application of the object detection system according to the first embodiment of the present invention in tracking targets at different distances. In this case, the object detection system uses the first image capturing device, which has a relatively small angle of view, to capture the high resolution images of targets; and the second image capturing device, which has a relatively large angle of view, to capture a full-scene image of the area of interest.

[0016] In the process of analyzing the full-scene image of the area of interest using the second image capturing device, the area of interest is divided into several zones, each of which has a specific weight assigned thereto depending on the distance and orientation thereof to avoid a distant target from being ignored due to its small image size. That is, the probability of selecting a near and a distant target is the same. Considering that the targets of the same physical size at different distances would produce images of different sizes, the object detection system of the present invention would adjust the weight gradient to ensure that targets located in different zones are equally selected.

[0017] Fig. 6 shows a fourth example of application of the object detection system according to the first embodiment of the present invention in traffic surveillance. In this case, the area to be monitored is divided into several zones, such as first, second, third, and fourth zone 6, 7, 8, and 9, corresponding to an open place for the public, two traffic lanes, and a park area, respectively. Here, the second and the third zone 7 and 8, that is, the two traffic lanes, are assigned a weight higher than that assigned to the first zone 6 (i.e. the open place for the public), and the fourth zone 9, that is, the park area, is assigned the lowest weight. With different weights assigned to different zones, target appeared in the zone with the highest weight is selected in the first priority.

[0018] The object detection system according to a second embodiment of the present invention can be applied

to a surveillance system to improve the image data storage efficiency of the surveillance system. In this case, the surveillance system includes an image capturing device for capturing a first full-scene image of a predetermined area, and the first full-scene image having a first image resolution; and a first data storing unit for receiving data of the first full-scene image captured by the image capturing device, so that the first full-scene image data can be stored and then transferred to a data identifying unit connected to the first data storing unit.

[0019] The data identifying unit receives the first full-scene image data transferred from the first data storing unit, and identifies the image of at least one target object appeared in the first full-scene image, and divides the first full-scene image data into target image data and background image data. The data identifying unit includes the object detection system according to the second embodiment of the present invention for detecting data of at least one target object appeared in the full-scene image data. The object detection system includes a processor for defining the full-scene image into at least a first and a second zone; a controller for assigning a first weight to the first zone and a second weight to the second zone, wherein the first weight is higher than the second weight; an image capturing device for capturing an image of a target object appeared in the first zone prior to capturing an image of the target object appeared in the second zone; a data converting unit for receiving the background image from the data identifying unit and converting the received background image having the first image resolution to an image having a second image resolution, wherein the second image resolution is lower than the first image resolution; and an image synthesizer for receiving the background image having the second image resolution and the target image having the first image resolution to synthesize a second full-scene image, which includes the background image having the second image resolution and the target image having the first image resolution.

[0020] Please refer to Figs. 7 and 8, which show a method of monitoring vehicles appeared on a road using the above-described surveillance system employing the object detection system according to the second embodiment of the present invention. The method includes the following steps:

- (1) Use an image capturing device to capture a first full-scene image 10 of a predetermined area to be monitored, and the first full-scene image 10 having a first image resolution;
- (2) Store the first full-scene image 10 in a first data storing unit, and transfer the data of the first full-scene image 10 from the first data storing unit to a data identifying unit; and
- (3) Identify from the first full - scene image 10 an image of at least one target object 11 of interest (i.e.

a vehicle), and divide the first full-scene image 10 into a target image and a background image using the data identifying unit.

[0021] Wherein the data identifying unit includes the object detection system according to the second embodiment of the present invention, which detects at least one target object 11, appeared in the first full-scene image 10 via the following steps:

- (a) Define the first full-scene image 10 into at least a first zone 101 and a second zone 102;
- (b) Assign a first weight to the first zone 101, and a second weight to the second zone 102; wherein the first weight is higher than the second weight;
- (c) Use an image capturing device to capture an image of the target object 11 appeared in the first zone 101 prior to capturing an image of the target object appeared in the second zone 102;
- (d) Use a data converting unit to receive the background image from the data identifying unit, and convert the received background image having the first image resolution to an image having a second image resolution, wherein the second image resolution is lower than the first image resolution; and
- (e) Use an image synthesizer to receive the background image having the second image resolution and the target image having the first image resolution to synthesize a second full-scene image 12, which includes the background image having the second image resolution and the target image having the first image resolution.

[0022] In brief, a full-scene image 10 having the target object 11 appeared therein is captured using a high-resolution image capturing device, and then, the captured full-scene image 10 is subjected to image processing to keep the image of the target object 11 in the high-resolution while the image other than the target object 11 is treated as background, which is processed to have a lower image resolution in order to lower the burden of transmission and storage of image data and reduce the memory space occupied by the image data, enabling the memory to store only the more useful image data.

[0023] An object detection system according to a third embodiment of the present invention may be applied to a surveillance system, which includes an image capturing device for capturing a full-scene image of a predetermined area to be monitored; and a first data storing unit for receiving data of the full-scene image captured by the image capturing device, so that the full-scene image data can be stored and then transferred to a data identifying unit connected to the first data storing unit.

[0024] The data identifying unit receives the full-scene

image data transferred from the first data storing unit, and identifies the image of at least one target object appeared in the full-scene image, and divides the full-scene image into target image and background image. The data identifying unit includes the object detection system according to the third embodiment of the present invention for detecting at least one target object appeared in the full-scene image. The object detection system includes a processor for defining the full-scene image into at least a first and a second zone; a controller for assigning a first weight to the first zone and a second weight to the second zone, wherein the first weight is higher than the second weight; an image capturing device for capturing an image of a target object appeared in the first zone prior to capturing an image of the target object appeared in the second zone; and a second data storing unit for receiving data of the target image, and data of the background image previously stored on the first data storing unit is deleted from the first data storing unit when the data of the target image has been stored on the second data storing unit.

[0025] Please refer to Figs. 9 and 10 which show a method of surveillance of at least one target object appeared in a predetermined area using the above-described surveillance system employing the object detection system according to the third embodiment of the present invention. The method includes the following steps:

- (1) Use an image capturing device to capture a full-scene image 13 of a predetermined area to be monitored;
- (2) Store data of the captured full-scene image 13 on a first data storing unit;
- (3) Transfer the data of the full-scene image 13 from the first data storing unit to a data identifying unit, which is connected to the image capturing device; and
- (4) Use the data identifying unit to identify the image of at least one target object 141, 142, which is a vehicle or a person in this case, appeared in the full-scene image 13, and divide the full-scene image 13 into image of the target object 141, 142 and background image; wherein the data identifying unit includes the object detection system according to the third embodiment of the present invention, which detects at least one target object 141 appeared in the full-scene image 13 via the following steps:

- (a) Define the full-scene image 13 into at least a first zone 131 and a second zone 132;
- (b) Assign a first weight to the first zone 131, and a second weight to the second zone 132; wherein the first weight is higher than the second

weight;

(c) Use an image capturing device to capture an image of the target object 141 appeared in the first zone 131 prior to capturing an image of the target object 142 appeared in the second zone 132;

(d) Transfer the image data of the target object 141 to a second data storing unit; and

(e) Delete the background image data from the first data storing unit when the image data of the target object 141 has been transferred to the second data storing unit.

[0026] In a next cycle of surveillance, the image of the target object 142 is captured.

[0027] Since only the images of the target objects 141, 142 are stored in the memory while the background image data is completely deleted, the memory space occupied by the captured image is greatly reduced. In brief, a full-scene image 13 having the target object appeared therein is captured using an image capturing device, and then, the captured full-scene image 13 is subjected to image processing to keep the images of the target objects 141, 142 while the image other than the target objects 141, 142 are treated as background, which is completely deleted in order to lower the burden of transmission and storage of image data and reduce the memory space occupied by the image data, enabling the memory to store only the more useful image data.

[0028] Please refer to Fig. 11 which shows an example of applying an object detection system according to a fourth embodiment of the present invention to still another surveillance system. In this case, the surveillance system includes a first image capturing device 15 having a first angle of view for capturing a full-scene image 151 of a predetermined area to be monitored; a second image capturing device 16 having a second angle of view smaller than the first angle of view and a second image resolution for tracking and capturing an image of at least one target object 17 appeared in the predetermined area to be monitored, wherein the second image capturing device may be movable, or immovable but with a moveable mirror in front of it; and an object detection system according to a fourth embodiment of the present invention for controlling the second image capturing device 16 in tracking the target.

[0029] The object detection system includes a processor for receiving data of the full-scene image 151 from the first image capturing device 15, and defining the full-scene image 151 into at least a first zone 152 and a second zone 153; a controller for assigning a first weight to the first zone 152 and a second weight to the second zone 153, wherein the first weight is higher than the second weight; and a target locating device for locating a target object 17 appeared in the first zone 152 prior to

locating a target appeared in the second zone 153., When the second image capturing device 16 is movable, it follows the location of the target object 17 provided by the object detection system to track the target object 17; and when the second image capturing device 16 is immovable, a movable mirror is further provided to reflect an image of the target object 17 to the second image capturing device 16 to achieve the purpose of tracking the target object 17. In brief, in this application example, the first image capturing device 15 captures a full-scene image 151, the object detection system locates the position of the target object 17, and then the second image capturing device 16 is driven to lock on the target object 17 and capture the target image with high resolution.

[0030] The present invention has been described with some preferred embodiments thereof and it is understood that many changes and modifications in the described embodiments can be carried out without departing from the scope and the spirit of the invention that is intended to be limited only by the appended claims.

Claims

1. An object detection system for detecting at least one target object present in an area of interest, the system comprising:
 - a processor for defining the area of interest into at least a first region and a second region;
 - a controller for assigning a first priority to the first region and assigning a second priority to the second region, wherein the first priority is higher than the second priority; and
 - a first image capturing member for capturing image of the target object present in the first region prior to capturing image of the target object present in the second region.
2. The object detection system as claimed in claim 1, further comprising a second image capturing member for capturing a panoramic image of the area of interest.
3. The object detection system as claimed in claim 2, wherein the first image capturing member has a smaller angle of view than the second image capturing member.
4. The object detection system as claimed in claim 1, wherein the first image capturing member doesn't capture image of the target object present in the second region when the second priority is set to be zero.
5. The object detection system as claimed in claim 1, wherein the processor changes sizes and locations of the first region and the second region with a predetermined time period.
6. The object detection system as claimed in claim 1, wherein the controller varies the first priority and the second priority with a predetermined time period.
7. The object detection system as claimed in claim 1, wherein the controller lowers the first priority or the second priority after the first image capturing member captured the target object present in the first region or the second region over a predetermined time.
8. The object detection system as claimed in claim 1, wherein values of the first priority and the second priority are successively increased in at least one predetermined direction.
9. An object detecting method for detecting at least one target object present in an area of interest, the method comprising the steps of:
 - defining the area of interest into at least a first region and a second region;
 - assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority; and
 - capturing an image of the target object in the first region prior to capturing an image of the target object in the second region with a first image capturing member.
10. The object detecting method as claimed in Claim 9, further comprising the step of capturing a panoramic image of the area of interest with a second image capturing member.
11. The object detection system as claimed in claim 10, wherein the first image capturing member has a smaller angle of view than the second image capturing member.
12. The object detecting method as claimed in Claim 9, wherein the first image capturing member doesn't capture image of the target object present in the second region when the second priority is set to be zero.
13. The object detection method as claimed in claim 9, further comprising the step of: changing sizes and locations of the first region and the second region with a predetermined time period.
14. The object detection method as claimed in claim 9, further comprising the step of: varying the first priority and the second priority with a predetermined time period.
15. The object detection method as claimed in claim 9, further comprising the step of: lowering the first priority or the second priority after the first image capturing member captured the target object present in the first region or the second region over a predetermined time.

turing member captured the target object present in the first region or the second region over a predetermined time.

16. The object detection method as claimed in claim 9, wherein values of the first priority and the second priority are successively increased in at least one predetermined direction. 5
17. A surveillance system comprising: 10
- an image capturing device for acquiring a first panoramic image data with a first resolution from a predetermined surveillance area;
 - a first data saving member for receiving the first panoramic image data captured by the image capturing device such that the first panoramic image data can be stored in the first data saving member and then transferred to the data identifying member; 15
 - a data identifying member connected to the first data saving member for receiving the first panoramic image data transferred from the first data saving member and for identifying image data of at least one target object from the first panoramic image data and dividing the first panoramic image data into target object image data and background image data; 20
 - the data identifying member comprising an object detection system for detecting at least one target object present in the panoramic image data, and the object detection system comprising: 25
 - a processor for defining the first panoramic image data into at least a first region and a second region; 30
 - a controller for assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority; and 35
 - an image capturing member for capturing an image of the target object present in the first region prior to capturing an image of the target object present in the second region; 40
 - a data converting member for receiving the background image data from the data identifying member and converting the background image data from the first resolution into a second resolution, wherein the second resolution is lower than the first resolution; and 45
 - an image synthesizer for receiving the background image data with the second resolution and the target object image data with the first resolution, and forming a second panoramic image data with the background image data with the second resolution and the target image data with the first resolution. 50 55

18. A surveillance method comprising the steps of:

acquiring a first panoramic image data with a first resolution from a predetermined surveillance area by an image capturing device;

saving the first panoramic image data in a first data saving member;

transferring the first panoramic image data from the first data saving member to a data identifying member;

identifying image data of at least one interested target object from the first panoramic image data and dividing the first panoramic image data into target object image data and background image data by the data identifying member, wherein the data identifying member comprises an object detection system for detecting at least one target object present in the first panoramic image data, the object detection system comprising:

defining the first panoramic image data into at least a first region and a second region;

assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority; and

capturing an image of the target object present in the first region prior to capturing an image of the target object present in the second region with an image capturing member;

receiving the background image data from the data identifying member and converting the background image data from the first resolution into a second resolution by a data converting member, wherein the second resolution is lower than the first resolution; and

receiving the background image data with the second resolution and the target image data with the first resolution and forming a second panoramic image data with the background image data with the second resolution and the target image data with the first resolution by an image synthesizer.

19. A surveillance system comprising:

- an image capturing device for acquiring a panoramic image data from a predetermined surveillance area;
- a first data saving member for receiving the first panoramic image data captured by the image capturing device such that the panoramic image data can be stored in the first data saving member and then transferred to the data identifying member;
- a data identifying member connected to the first data saving member for receiving the first panoramic image data transferred from the first data saving member and for identifying image data of at least one target object from the panoramic

image data and dividing the panoramic image data into target object image data and background image data;
 wherein the data identifying member comprises an object detection system for detecting at least one target object present in the panoramic image data, and the object detection system comprising:
 a processor for defining the panoramic image data into at least a first region and a second region;
 a controller for assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority;
 an image capturing member for capturing image of the target object present in the first region prior to capturing image of the target object present in the second region; and
 a second data saving member for receiving the target object image data; and

wherein the background image data in the first data saving member are deleted after the target image data are in the second data saving member.

20. A surveillance method, comprising the steps of:

acquiring a panoramic image data from a predetermined surveillance area by an image capturing device;
 saving the first panoramic image data in a first data saving member;
 transferring the panoramic image data from the first data saving member to a data identifying member;
 identifying image data of at least one target object from the panoramic image data and dividing the panoramic image data into target image data and background image data by the data identifying member connected to the image capturing device,

wherein the data identifying member comprises an object detection system for detecting at least one target object present in the panoramic image data, and the object detection system comprising:

defining the panoramic image data into at least a first region and a second region;
 assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority; and
 capturing an image of the target object present in the first region prior to capturing an image of the target object present in the second region with an image capturing member;

transferring the target image data in a second data saving member;
 deleting the background image data in the first data saving member after transferring the target image data in the second data saving member.

21. A surveillance system comprising:

a first image capturing device having a first resolution for acquiring a panoramic image data from a predetermined surveillance area;
 a second image capturing device having a second resolution for tracking and acquiring at least one target object present in the predetermined surveillance area, wherein the second resolution is higher than the first resolution; and
 an object detection system for controlling the tracking of the second image capturing device, the object detection system comprising:
 a processor for receiving the panoramic image data from the first image capturing device and defining the panoramic image data into at least a first region and a second region;
 a controller for assigning a first priority to the first region and a second priority to the second region, wherein the first priority is higher than the second priority; and
 a locating member for locating an image of the target object present in the first region of the area of interest prior to locating an image of the target object present in the second region of the area of interest; and
 wherein the second image capturing device tracks the target object by following the location of the target object provided by the object detection system.

22. The surveillance system as claimed in claim 21, wherein the second image capturing device is movable.

23. The surveillance system as claimed in claim 21, wherein the second image capturing device is not movable and further includes a movable mirror to reflect the image of the target object to the second image capturing device.

24. A surveillance method, comprising the steps of:

acquiring a panoramic image data from a predetermined surveillance area by a first image capturing device with a first angle of view;
 detecting the movement of at least one target object present in the predetermined surveillance area, wherein the detecting step comprises the steps of:
 receiving the panoramic image data from the first image capturing device and defining the

panoramic image data into at least a first region
and a second region;
assigning a first priority to the first region and a
second priority to the second region, wherein
the first priority is higher than the second priority; 5
and
locating an image of the target object present in
the first region prior to locating an image of the
target object present in the second region; and 10
tracking the target object by following the loca-
tion of the target object provided by the object
detecting step with a second image capturing
device, wherein the second image capturing de-
vice having a second angle of view smaller than 15
the first angle of view.

25. The surveillance method as claimed in claim 24,
wherein the second image capturing device is mov-
able.

26. The surveillance method as claimed in claim 24,
wherein the step of tracking the target object is per-
formed by a movable mirror such that the image of
the target object can be reflected to the second im-
age capturing device when the second image cap- 25
turing device is not movable.

20

30

35

40

45

50

55

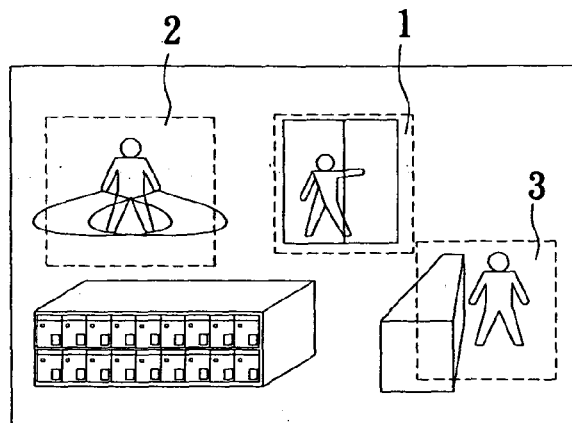


Fig. 1

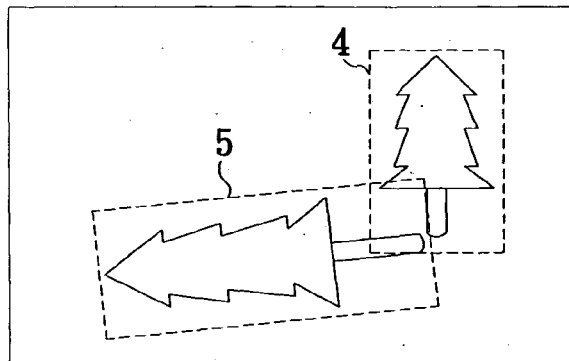


Fig. 2

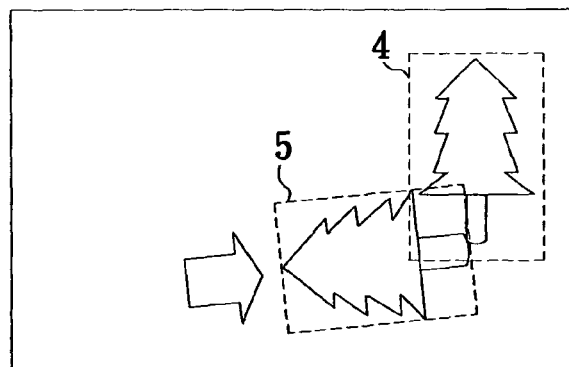


Fig. 3

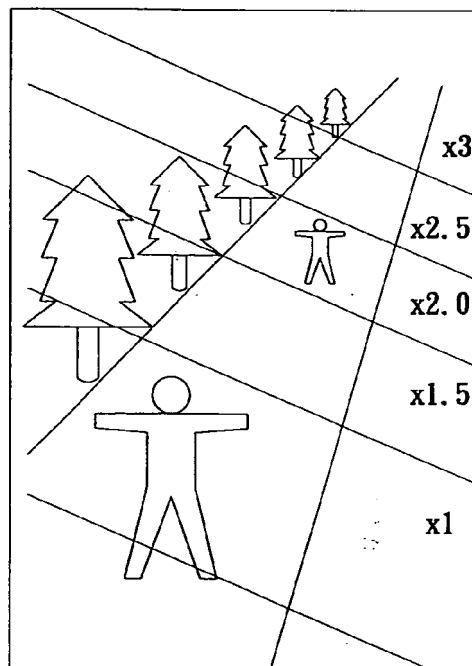


Fig. 4

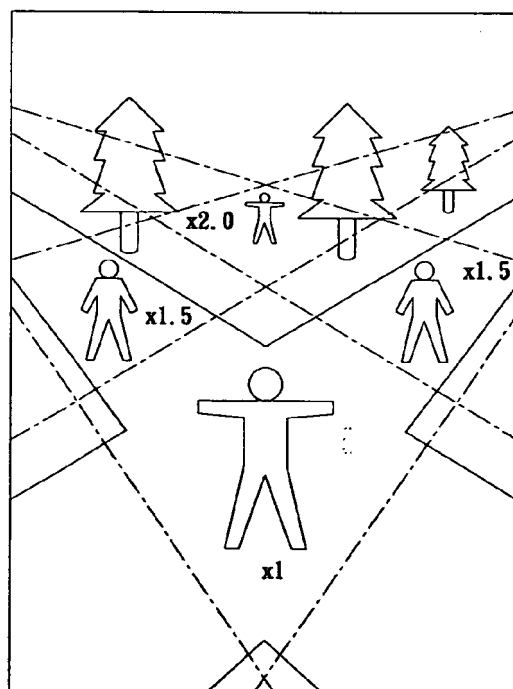


Fig. 5

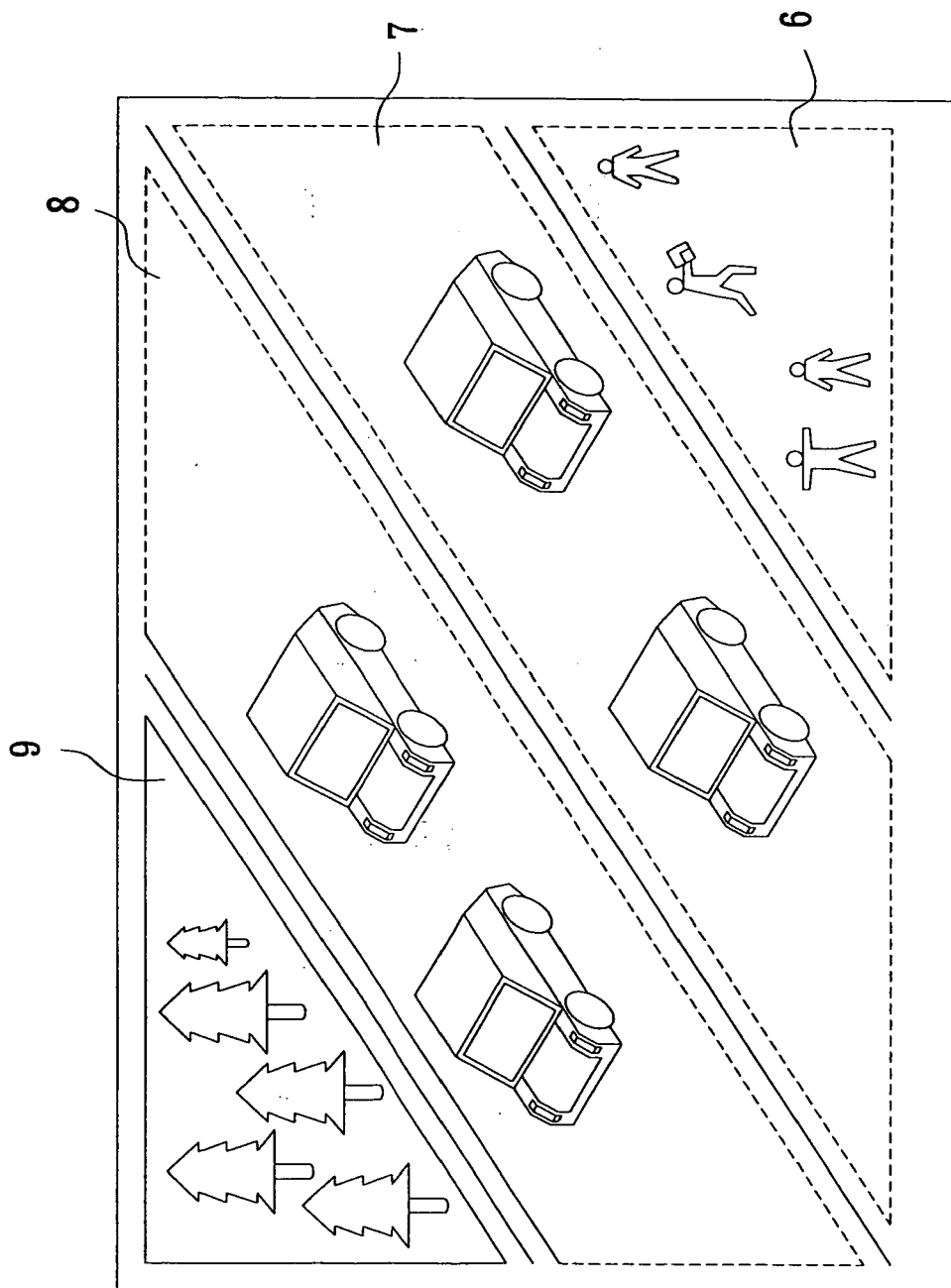


Fig. 6

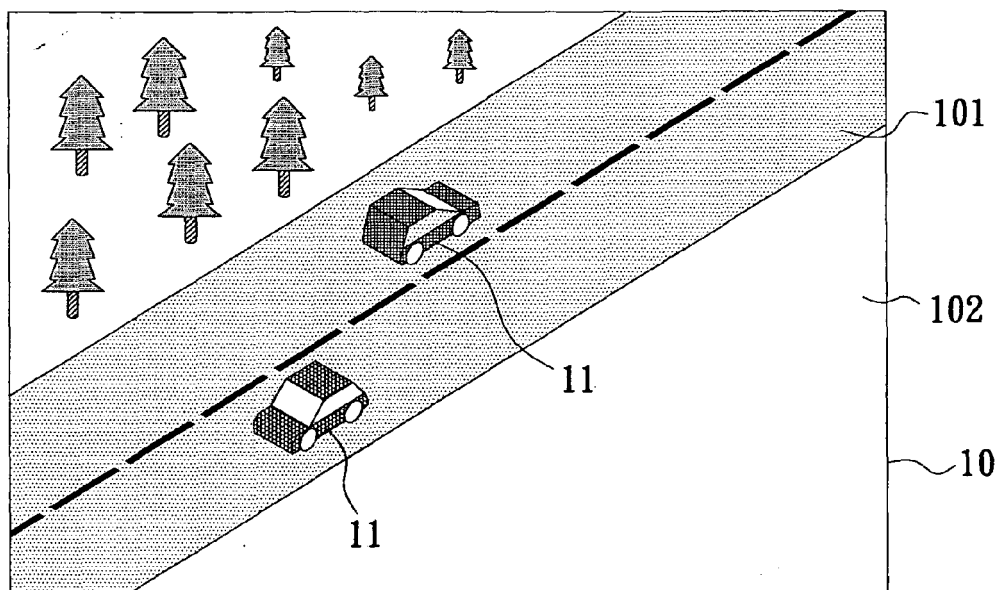


Fig. 7

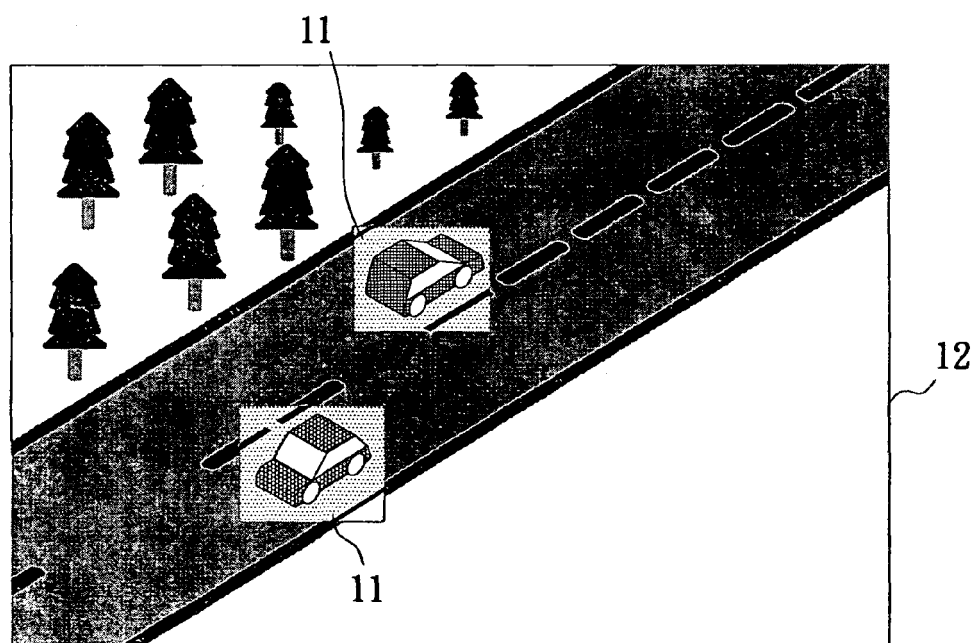


Fig. 8

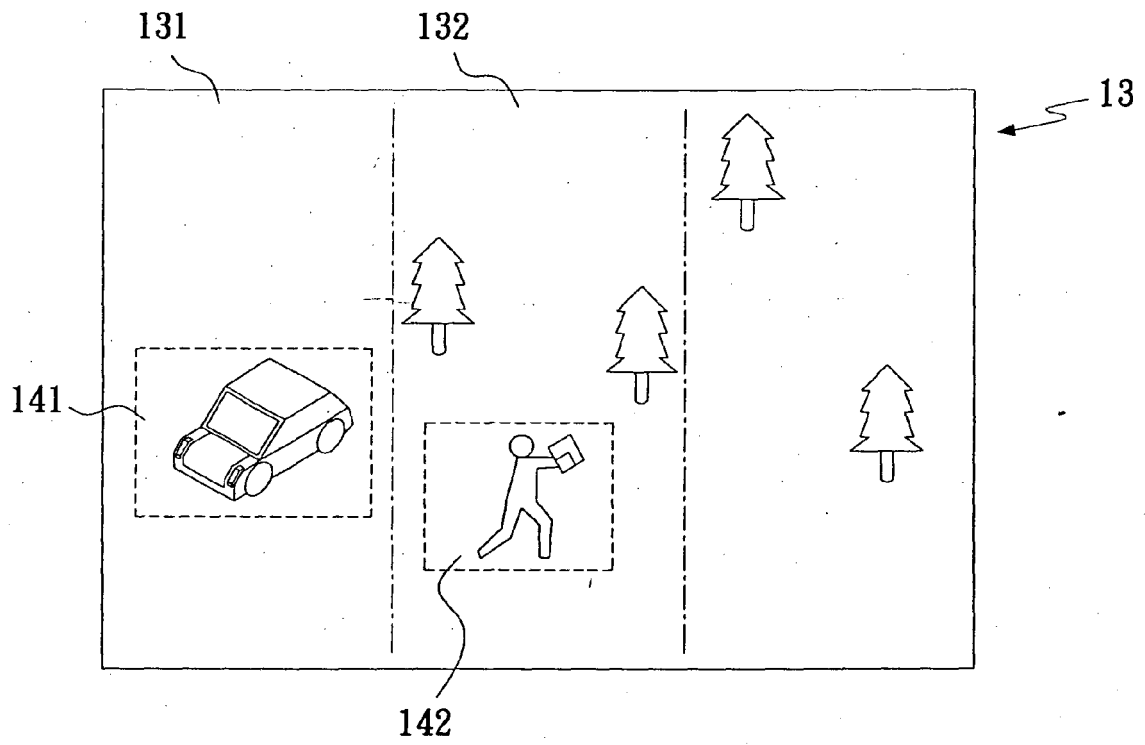


Fig. 9

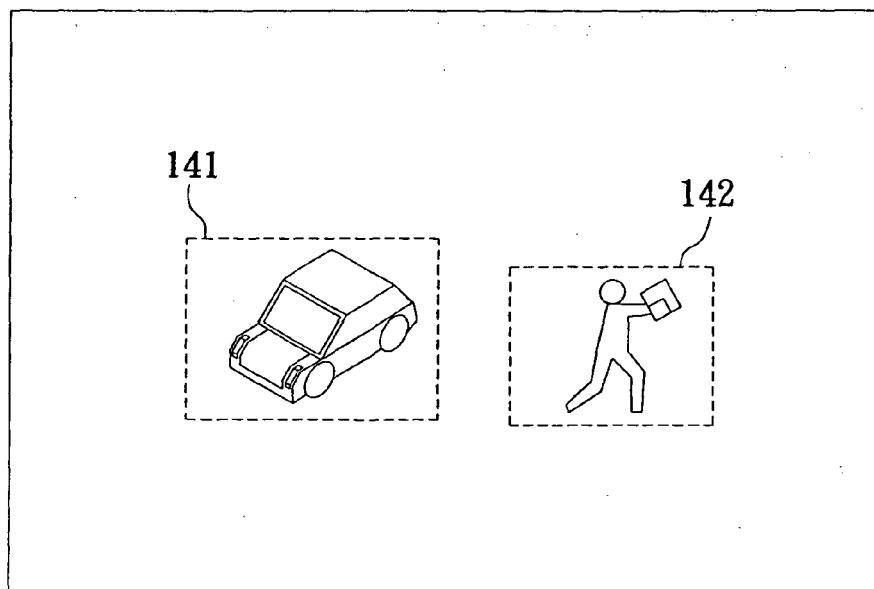


Fig. 10

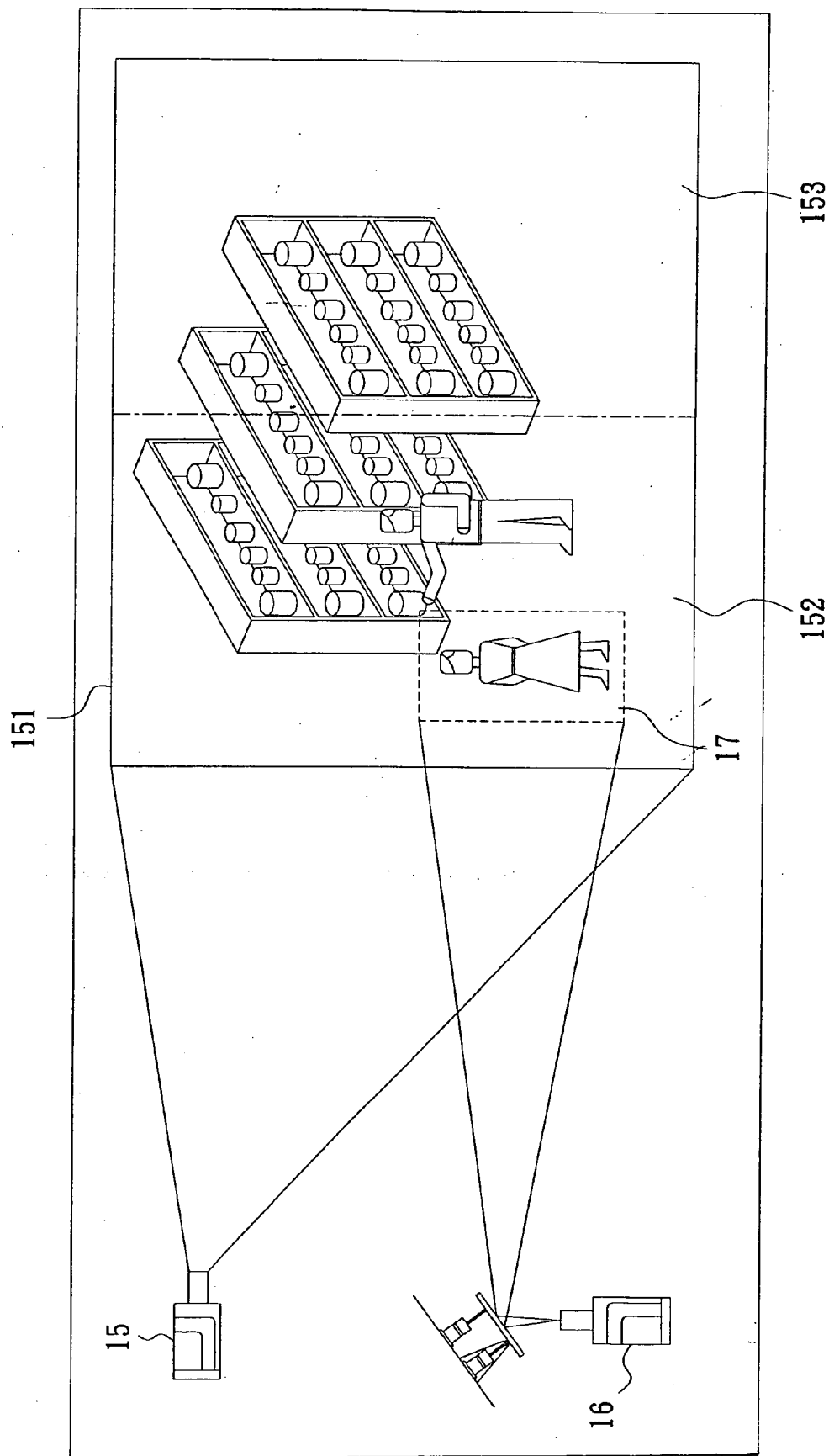


Fig. 11



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 6335

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/012681 A1 (FUJII HIROFUMI) 19 January 2006 (2006-01-19) * paragraphs [0012], [0013] * * paragraph [0018] * * paragraph [0052] * * paragraphs [0062], [0063] * * paragraphs [0070], [0071] * -----	1-4,9-12	INV. G08B13/196
X	US 2003/025599 A1 (MONROE DAVID A) 6 February 2003 (2003-02-06) * paragraphs [0121] - [0123] * * paragraphs [0163] - [0165] * -----	1,4-6,9, 12-14	
X	US 2002/104094 A1 (ALEXANDER BRUCE ET AL) 1 August 2002 (2002-08-01) * paragraphs [0056], [0061] * -----	1,4,9,12	
			TECHNICAL FIELDS SEARCHED (IPC)
			G08B H04N G06T G06K
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		4 August 2006	DE LA CRUZ VALERA, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2
EPO FORM 1503 03.82 (P04C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1 - 16



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-16

Object detection system and method. Establishment of weighted zones. Variation of the priorities according to predetermined time period or over a predetermined time.

2. claims: 17,18,21-24

Surveillance system and method. Integration of high resolution image into background, tracking using high resolution

3. claims: 19-20

Surveillance system and method. Deletion of background images.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 00 6335

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-08-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006012681 A1	19-01-2006	CN 1722826 A	18-01-2006
		EP 1622107 A1	01-02-2006
		JP 2006033224 A	02-02-2006

US 2003025599 A1	06-02-2003	NONE	

US 2002104094 A1	01-08-2002	NONE	
