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(54) **Method and related guarding device for guarding at least one object**

(57) The present invention relates to a Method, a related system, and guarding device for guarding at least one object registered at a guarding device where each of the at least one object that is associated with a tag has

a unique identification. The guarding device determines the presence of each of the at least one object by reading a tag that is associated with the object, over a short-range wireless connection.

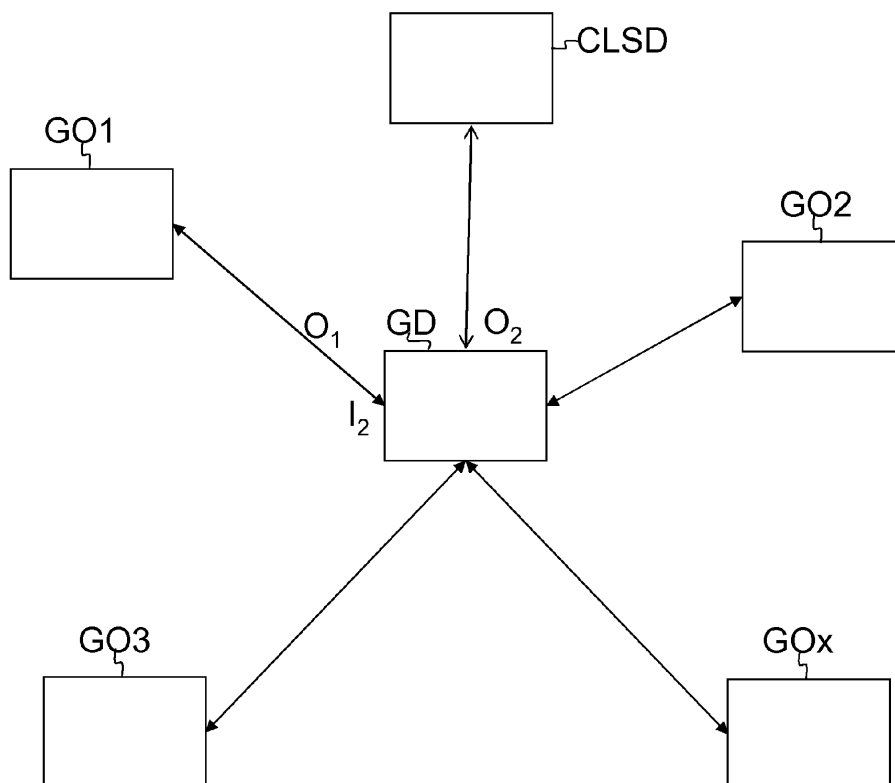


FIG.1

Description

[0001] The present invention relates to a Method for guarding at least one object according to the preamble of claim 1, a related system according to the preamble of claim 6 and a related object guarding device according to the preamble of claim 11.

[0002] Today, several systems that guard your wallet or other valueables are available. Such systems vary from wired connected devices to wireless devices that periodically check if the wallet or valuable is within range. Furthermore, with mobile payment becoming more and more important, it will be equally or more important to track you mobile for possible theft or loss. One such a method for guarding objects by a guarding device is already known in the art, e.g. from "blue nio", wherein each of the guarded objects is associated with a Bluetooth tag and a Bluetooth connection between the Bluetooth tag of the guarded object and the Bluetooth transceiver of the guarding device is established. As soon as a guarded object for some reason moves out of reach of the Bluetooth transceiver of the guarding device, or the other way around, the Bluetooth connection is interrupted which is detected directly and results in an alarm event in which the user is notified of loss of a guarded object.

[0003] Disadvantageously, such Bluetooth tag attached to the guarded object is an active device including a transceiver that requires a power source which regularly needs to be recharged in order to actively support the established Bluetooth connection. Additionally, each guarded object needs to be equipped with a dedicated tag including a Bluetooth transceiver and a dedicated Bluetooth connection needs to be established continuously in order to guard each of the objects. Hence, only a relatively small number of objects can be guarded due to the fact that each object requires a separate Bluetooth transceiver for maintaining a connection between a guarding device and guarded object.

[0004] An objective of the present invention is to provide a Method for guarding at least one object and related devices of the above known type but wherein the mentioned disadvantage does not occur.

[0005] According to the invention, this object is achieved by the guarding at least one object according to claim 1, a related system according to claim 6 and a related object guarding device according to claim 11.

[0006] Indeed, by first associating each of the at least one object to be guarded with a tag where the tag is having a unique identification and subsequently, the guarding device, determining the presence of each of the at least one object through reading the tag that is associated with the object to be guarded over a short-range wireless connection, the presence of a tag can be determined by the fact that a tag-identification can be read out and further based on the tag-identification it can be determined which tag is read out which object to be guarded is found to be present.

[0007] As each object is associated with tag having a

unique identification in the reading based on the unique identification the present object to be guarded can be identified.

[0008] As such a tag may be a RFID-tag which is a passive tag that must be read out by an active tag reader. Hence no continuous connection is necessary between the tag and the tag reader. The objects to be guarded first are registered at the guarding device which in case of RFID tags can be done by touching the RFID-tag of the object to the reader of the guarding device.

[0009] An additional advantage of the application of Tags, in case of an RFID-tag only at reading out the Tag to be read out needs to be enforced, hence no continuous connection between the guarding device and the objects to be guarded is necessary.

[0010] Such short range wireless connection may be in a range of up to approximately 4 meters which depends on the type of tag.

[0011] High-frequency tags are read from about 1 meter and UHF tags are read from 3 to 6 meters .

[0012] Another characterizing embodiment of the present invention is described in claim 2, claim 7 and claim 12.

[0013] Additionally, the guarding device is able to determine a location of each of the at least one objects to be guarded. By determining a location of such objects the traceability of such object is improved significantly.

[0014] The location of each of the objects to be guarded is substantially the same location as the location of the guarding device as the reach of such a tag is relatively small. The reach of such a tag is dependent on the type of tag.

[0015] Such location may be determined using a location determination part like Global positioning System further referred to as GPS, alternatively applying GSM triangulation techniques or any other suitable method for location determination like the application of femtocells in case of indoor use. Alternatively the location may be determined by an external device that communicates a determined location over a wired or wireless link to the guarding device.

[0016] Such Location determination part LDP may be integrated in the guarding device or alternatively be a separate external device that is coupled to the guarding device GD.

[0017] The location may be stored continuously at reading the unique identification of the tag associated to an object to be guarded or alternatively may be stored only at detection that the object to be guarded is not present indicating a last known position of the object to be guarded.

[0018] As soon as a registered tag-is out of reach of the tag-reader, i.e. the associated object becomes "lost", the current GPS coordinates of the Guarding device linked is linked to the tag Identification where this can be done at the guarding device GD itself, or somewhere on a central server. In this case the Guarding Device also has to have some form of wireless connectivity (like WiFi

or 3G network). In this way the user always is aware of the last location of the tagged object to be guarded.

[0019] A further characterizing embodiment of the present invention is described in claim 3, claim 8 and claim 13.

[0020] Another characterizing feature of the present invention is that the guarding device is able to generate an alarm in case the presence of an object of the at least one object is not detected, in order to notify the person of loss or theft. Such an alarm may be an audible or visual alarm, vibration alarm or a combination thereof.

[0021] A further characterizing embodiment of the present invention is described in claim 4, claim 9 and claim 14.

[0022] Additionally, the location of each of the at least one object determined may be forwarded to a central location storage device. In this way each of the objects to be guarded can be guarded and/or traced from a central location or the location can still be traced in case the guarding device is lost as well.

[0023] Another characterizing embodiment of the present invention is described in claim 5, claim 10 and claim 15.

[0024] Additionally, the location of the guarding device can be forwarded to the central location storage device. In this way even the location of the guarding device, in addition to the location of the objects to be guarded can be centrally guarded and/or traced from a central location. In case of loss or theft of the guarding device the user thereof may via the central location storage server keep track of the location and or recover the guarding device and possibly the objects to be guarded.

[0025] Further characterizing embodiments of the present method for guarding objects are mentioned in the appended claims.

[0026] It is to be noticed that the term 'comprising', used in the claims, should not be interpreted as being restricted to the means listed thereafter. Thus, the scope of the expression 'a device comprising means A and B' should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0027] Similarly, it is to be noticed that the term 'coupled', also used in the claims, should not be interpreted as being restricted to direct connections only. Thus, the scope of the expression 'a device A coupled to a device B' should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means.

[0028] The above and other objects and features of the invention will become more apparent and the invention itself will be best understood by referring to the following description of an embodiment taken in conjunction with the accompanying drawings wherein:

FIG. 1 represents a functional representation of the system for guarding at least one object of the present invention where the system includes objects to be guarded G01, G02, G03, G04, a guarding device GD and a central location storage server CLSS; and FIG. 2 represents the functional representation of the object to be guarded GO1 with associated tag, and the guarding device GD according to the present invention.

[0029] In the following paragraphs, referring to the drawings, an implementation of the system for guarding at least one object according to the present invention will be described. In the first paragraph of this description the main elements of this network with its functional parts as presented in respective figures, FIG. 1 and FIG. 2 are described. In the second paragraph, all connections between the before mentioned network elements and described functional parts are defined. In the succeeding paragraph the actual execution of system for guarding at least one object is described.

[0030] First essential elements of this embodiment are in the current embodiment the four objects to be guarded, G01, G02, G03, G04 which respectively are a wallet which is associated with an RFID tag GO1, a keychain with car-keys which is associated with an RFID tag G02, a briefcase which is associated with an RFID tag G03 and a mobile phone which is associated with an RFID tag G04.

[0031] Further there is a guarding device GD that is able to guard the presence of each of the objects to be guarded G01, G02, G03, G04. The guarding device may be a separate device including the required functionality, but alternatively may be incorporated in a PDA or Smart-phone both with integrated GPS module and integrated tag reader such as a RFID reader. Both, PDA or Smart-phone alternatively may be coupled with an external GPS module and /or external RFID-reader.

[0032] Finally there is a central location storage device CLSD which is adapted to store at least the current location of each of the objects to be guarded and in addition at least the current location of the guarding device. This device for instance may be located at the users premises at the edge of an access network or be located in the cloud internet network at a central server. This may be implemented using a web application our cloud-based application being centrally hosted.

[0033] The guarding device GD is coupled to each of the objects to be guarded G01, G02, G03, G04 over short-range wireless connection between the tag and the tag reader.

[0034] The RFID tag reader device may be a powerful long-range RFID reader.

[0035] The guarding device GD in addition is coupled to the central location storage device over any connection like a wireless WIFI or 3G data connection.

[0036] The first object to be guarded GO1, i.e. the wallet has an RFID-Tag attached. This tag carries a unique

identification. Further the object to be guarded is associated with a tag forwarding part CFP being an antenna for forwarding information stored at the RFID tag at reading the RFID tag by means of the RFID-reader. The Guarding device first comprises a presence determination part TRP that is adapted to determine the presence of each of the at least one object by reading a tag associated with the object G01, G02, G03, G04 over a short-range wireless connection, between the tag and the tag-reader, said tag having a unique identification. Such short range wireless connection in this application typically having a range of approximately 1 meter although higher ranges are obtainable depending on the type of tag and Tag-reader. This presence determination part TRP in this embodiment includes an RFID tag reader. Hence, the guarding device may be a NFC enabled device like an NFC enabled PDA, mobile phone like Smartphone with RFID tag reader.

[0037] Further the guarding device comprises a management part MP that is able to control all the presence determination action for all registered objects, the location handling alarm handling and further associated actions.

[0038] The guarding device may further comprise a tag holding part THP that is able to hold all tags that are registered together with their associated unique identification and potential other info like a current location or last location of the corresponding object.

[0039] The Guarding Device GD in addition comprises a location determination part LDP, that is adapted to determine a location of each of the at least one object at reading the tag associated with the object to be guarded.

[0040] By determining a current location or last location of such objects the traceability of such object is improved significantly.

[0041] Such location may be determined using a location determination part LDP like Global positioning System further referred to as GPS, alternatively applying GSM triangulation techniques or techniques or any other suitable method for location determination.

[0042] A further alternative location determination for indoor environments would be the positioning of anchor-tags, e.g. RFID-tags, fixed to certain places where the tag in a unique way determines the location. If such anchor-tag is detected the location of the guarding device and objects to be guarded can be determined to be with a certain rage of this determined anchor-tag.

[0043] Alternatively the location may be determined by an external device that communicates a determined location over a wired or wireless link to the guarding device.

[0044] In the current embodiment, the location determination part LDP is a GPS receiver which is included in the guarding device GD, which in this embodiment is an NFC enabled Smartphone having an integrated GPS-receiver.

[0045] The Guarding Device GD further may comprise an alarm generating part AGP that is adapted to generate an alarm in case the presence of an object of the at least

one object G01, G02, G03, G04 is not detected due to loss, theft or other causes due to the tag getting out of reach of the tag reader.

[0046] Finally the Guarding Device GD further may comprise a location forwarding part LFP that is adapted to forward the location of each of the at least one object G01, G02, G03, G04 to a central location storage device CLSD .

[0047] The location forwarding part LFP further is adapted to forward the location of the guarding Device GD to a central location storage device CLSD.

[0048] The presence determination part TRP of the guarding device GD has an input terminal that is coupled with an input terminal of the Guarding device GD. The presence determination part TRP further is coupled to the management part MP that in turn further is coupled to the location determination part LDP. The management part MP further is coupled to the alarm generating part AGP and additionally coupled to the location forwarding part LFP and coupled to the Tag Holding part THP.

[0049] In order to explain the present invention it is assumed that a certain person owns a wallet to be guarded and other object to be guarded like mobile phone, car keys.

[0050] In addition the person owns the guarding device, e.g. a NFC enabled phone with integrated GPS module.

[0051] As such, each object to be guarded will carry a long range RFID tag, of which each is equipped with a unique ID.

[0052] At first each object that should be guarded is to be registered at the guarding device by touching the RFID tag associated with the object to be guarded. When the person leaves his house and he takes with him some of these RFID-equipped items (eg wallet, mobile phone, car keys, ...) he first touches the items with the Guarding device (which can for example be attached to a keyring).

[0053] The unique identification of the tag is read and stored in the tag holding part THP. Now the guarding device is aware which objects with an associated RFID tag in the environment of this person are objects that are to be guarded.

[0054] Additionally or alternatively it can be communicated to the central location database CLSD that the object to be guarded associated with the mentioned RFID is being associated with the Guarding device GD.

[0055] After registration the guarding device GD starts continuously reading each of the registered RFID tags subsequently.

[0056] At first the presence determination part TRP, i.e. the RFID-reader of the guarding device determines the presence of the first object to be guarded by reading a tag associated with the object G01, the wallet in this case over a short-range wireless connection, where the tag has a unique identification. If the wallet is within the range of the presence determination part TRP the tag and unique identification is read and compared by means of the management part MP, with tags and associated

identification as stored in the tag holding part THP. Furthermore the location determination part determines the current location of the wallet which in this case is the same location as the guarding device.

[0057] In case the presence determination part TRP of the guarding device cannot read the associated tag and corresponding identification, it is determined by means of the management part MP that the tag is out of reach of the presence determination part TRP due to loss theft or otherwise and hence the management part determines to instruct the alarm generating part to generate a visual and/or audible alarm signal. This sequence of checking the presence by reading the associated tag is repeated for each of the registered objects GO2, GO3, GO4. The location for each of the objects to be guarded is determined and possibly stored in the tag holding part THP being associated with the tag and the unique identification.

[0058] Alternatively, the location of each object to be guarded can be determined and stored only at the moment that the object to be guarded gets out of the reach of the RFID tag reader. The determined location can be stored in the tag holding Part THP and additionally or alternatively in the central location database CLSD.

[0059] After checking the presence of each of the objects GO1, GO2, GO3, GO4 the check is started again for each of the objects to be guarded.

[0060] Alternatively, the Guarding device GD now periodically scans for each of the registered objects within a certain range. If a registered object to be guarded is not within the range of the Guarding device GD, the device will not pick up the Identification of the associated tag of that particular object to be guarded and a by means of the management part MP a alarm-trigger is generated that by means of the alarm generating part AGP will notify the person that lost a registered object to be guarded.

[0061] Additionally, the Guarding Device GD further comprises a location forwarding part LFP that forwards the location determined by means of the location determination part, for each of the objects to be guarded GO1, GO2, GO3, GO4 to an object location storage device OLSD.

[0062] The Guarding Device GD further may comprises a location forwarding part LFP that additionally besides the location of each, adapted to forward said location of said guarding Device GD to an object location storage device OLSD. In case of loss or theft of the guarding device, still the location thereof can be traced and be applied for finding back the guarding device.

[0063] The Guarding device GD now periodically scans for the registered items within a certain range. When an item is not within the range of the Guard Keeper, the device will not pick up the ID of that particular item, and an alarm-trigger will start, noticing the person that he lost his item. In case a registered object is within the range, the location of the object is determined by means of the location determination part LDP, subsequently stored in the Tag holding part THP, under control of the

management part MP and possibly forwarded by the location forwarding part LFP towards the central location database CLSD.

[0064] It is to be noted that besides Radio Frequency tags also non Radio frequency tags, such as optical or magnetic tags can be applied instead.

[0065] A final remark is that embodiments of the present invention are described above in terms of functional blocks. From the functional description of these blocks, given above, it will be apparent for a person skilled in the art of designing electronic devices how embodiments of these blocks can be manufactured with well-known electronic components. A detailed architecture of the contents of the functional blocks hence is not given.

[0066] While the principles of the invention have been described above in connection with specific apparatus, it is to be clearly understood that this description is merely made by way of example and not as a limitation on the scope of the invention, as defined in the appended claims.

Claims

1. Method for guarding at least one object (GO1, GO2, GO3, GO4) registered at a guarding device (OGD), **CHARACTERISED IN THAT** each of said at least one object (GO1, GO2, GO3, GO4), being associated with a tag having a unique identification and **in that** said method comprises the step of:
 - a. determining, by said guarding device (OGD), the presence of each of said at least one object by reading a tag associated with said object (GO1, GO2, GO3, GO4) over a short-range wireless connection.
2. Method for guarding at least one object (GO1, GO2, GO3, GO4) according to claim 1, **CHARACTERISED IN THAT** said method further comprises the step of said guarding device (OGD), determining a location of each of said at least one object.
3. Method for guarding at least one object (GO1, GO2, GO3, GO4) according to claim 1 or claim 2, **CHARACTERISED IN THAT** said method further comprises the step of said guarding device (OGD), generating an alarm in case said presence of an object of said at least one object (GO1, GO2, GO3, GO4) is not detected.
4. Method for guarding at least one object (GO1, GO2, GO3, GO4) according to claim 2, **CHARACTERISED IN THAT** said method further comprises the step of forwarding said location of each of said at least one object (GO1, GO2, GO3, GO4) to a central location storage device.

5. Method for guarding at least one object (GO1, G02, G03, G04) according to claim 2 or claim 4, **CHARACTERISED IN THAT** said method further comprises the step of forwarding said location of said guarding device (OGD) to said central location storage device. 5
6. System for guarding at least one object (GO1, G02, G03, G04) registered at a guarding device (OGD), **CHARACTERISED IN THAT** each of said at least one object (GO1, G02, G03, G04), being associated with a tag having a unique identification and **in that** said system comprises: 10
 - a. presence determination part (TRP), adapted to determine the presence of each of said at least one object by reading a tag associated with said object (GO1, G02, G03, G04) over a short-range wireless connection. 15
7. System for guarding at least one object (GO1, G02, G03, G04) according to claim 6, **CHARACTERISED IN THAT** said system further comprises a location determination part (LDP), adapted to determine a location of each of said at least one object at reading said tag. 20 25
8. System for guarding at least one object (GO1, G02, G03, G04) according to claim 6 or claim 7, **CHARACTERISED IN THAT** said system further comprises an alarm generating part (AGP), adapted to generate an alarm in case said presence of an object of said at least one object (GO1, G02, G03, G04) is not detected. 30 35
9. System for guarding at least one object (GO1, G02, G03, G04) according to claim 7, **CHARACTERISED IN THAT** said system further comprises a location storage part (OLSD), adapted to store said location of each of said at least one object (GO1, G02, G03, G04). 40
10. System for guarding at least one object (GO1, G02, G03, G04) according to claim 7 or claim 9, **CHARACTERISED IN THAT** said system further comprises a location storage part (OLSP), further adapted to store said location of said guarding device (OGD). 45
11. Guarding Device (GD), for guarding at least one object (GO1, G02, G03, G04) registered at said guarding device (OGD), for use in a system according to claim 6, **CHARACTERISED IN THAT** said guarding device (GD) comprises: 50
 - a. presence determination part (TRP), adapted to determine the presence of each of said at least one object by reading a tag associated with said object (GO1, G02, G03, G04) over a short-range 55
- wireless connection, said tag having a unique identification.
12. Guarding Device (GD), for guarding at least one object (GO1, G02, G03, G04) according to claim 11, **CHARACTERISED IN THAT** said Guarding Device (GD), further comprises a location determination part (LDP), adapted to determine a location of each of said at least one object at reading said tag.
13. Guarding Device (GD), for guarding at least one object (GO1, G02, G03, G04) according to claim 11 or claim 12, **CHARACTERISED IN THAT** said Guarding Device (GD), further comprises an alarm generating part (AGP), adapted to generate an alarm in case said presence of an object of said at least one object (GO1, G02, G03, G04) is not detected.
14. Guarding Device (GD), for guarding at least one object (GO1, G02, G03, G04) according to claim 12, **CHARACTERISED IN THAT** said Guarding Device (GD), further comprises a location forwarding part (LFP), adapted to forward said location of each of said at least one object (GO1, G02, G03, G04) to an object location storage device (OLSD).
15. Guarding Device (GD) for guarding at least one object (GO1, G02, G03, G04) according to claim 12 or claim 14, **CHARACTERISED IN THAT** said Guarding Device (GD), further comprises a location forwarding part (LFP), adapted to forward said location of said guarding Device (GD) to an object location storage device (OLSD).

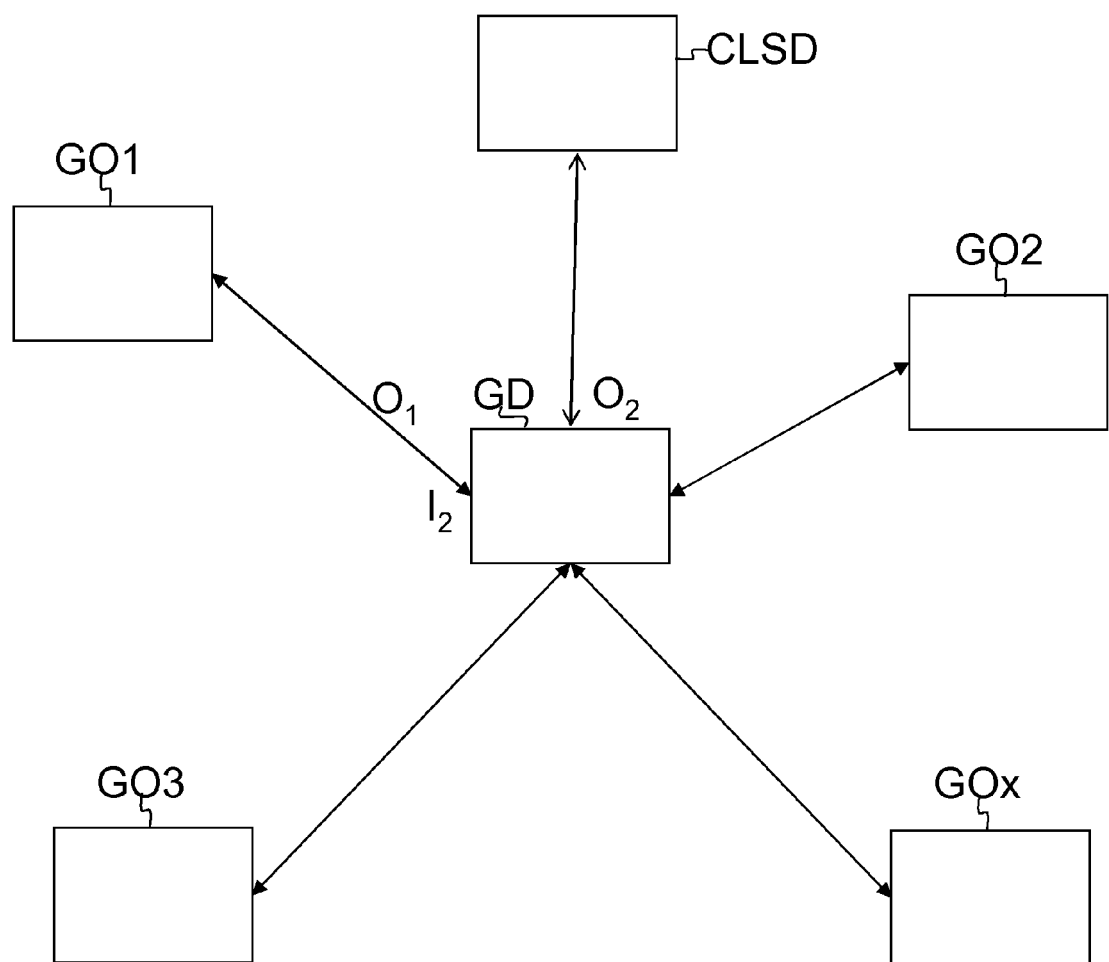


FIG.1

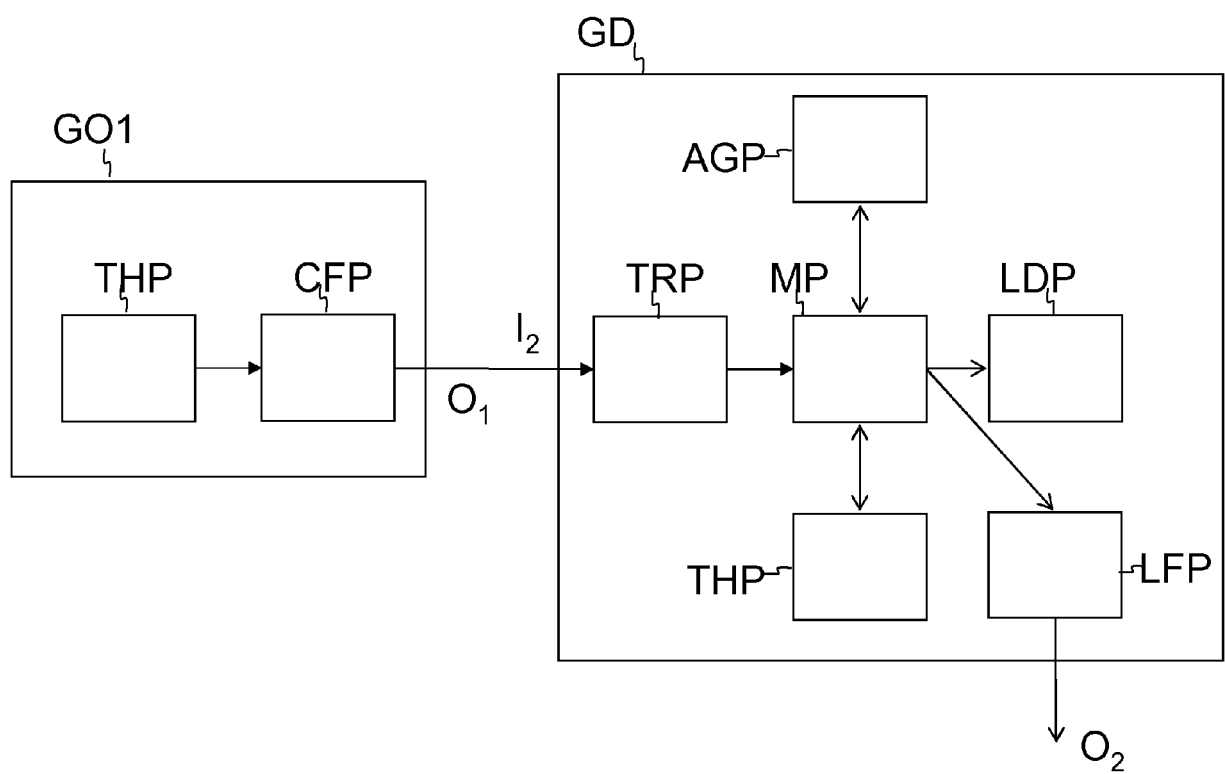


FIG.2



EUROPEAN SEARCH REPORT

Application Number
EP 10 30 5647

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	WO 2008/087409 A1 (HOUNSELL LTD [GB]; HOUNSELL BEN [GB]) 24 July 2008 (2008-07-24) * page 1, lines 15-23; figures 1-3 * * page 3, lines 12-32 * * page 10, line 30 - page 11, line 11 * * page 13, line 2 - page 13, line 29 * * page 17, lines 18-29 * -----	1-15	INV. G08B13/14 G08B21/24
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 November 2010	Examiner Fagundes-Peters, 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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 30 5647

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
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