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WO 2009/025894 A2 **WO 2009/021236 A1**
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(71) Applicant(s):
Cubic Corporation
(Incorporated in USA – California)
9333 Balboa Avenue, San Diego, California 92123,
United States of America

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(72) Inventor(s):
Jon D Macklin
Walter C Bonneau Jr
Bruce D Roberts

(74) Agent and/or Address for Service:
J A Kemp
14 South Square, Gray's Inn, London, WC1R 5JJ,
United Kingdom

(54) Title of the Invention: **Automatic integrated sensing and access control**
 Abstract Title: **Access control system detecting exposure to possible threat materials**

(57) An access control system for sensing exposure to items of interest of a person associated with a unique identifier of a media such as a fare card or ticket is disclosed. The access control system includes a unique identifier that is associated with the media, an exposure detector, a processor and an access control point. The exposure detector detects exposure of the media to an item of interest based upon a detected optical change in a detection material of the media. The processor flags the unique identifier when exposure to an item of interest is detected and a message is communicated away from the processor to a remote location when the unique identifier is flagged. The access control point can read the unique identifier of the media and can deny entry based upon the flag. Items of interest may be chemical compounds, nuclear materials, radiological materials, biological agents or explosives. The optical change may be a change in colour or a change in reflective photoluminescence. The system can therefore detect a ticket user has been exposed to explosives, and therefore the user may pose a terrorist threat, based upon an optical change in the detection material of their ticket.

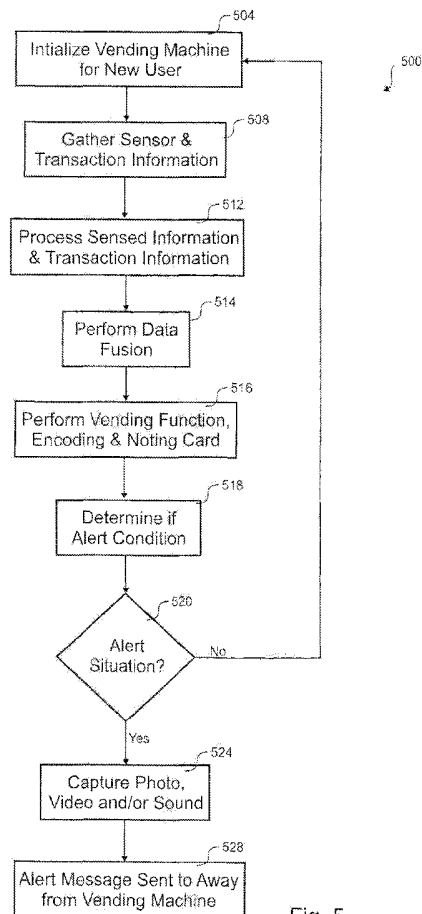


Fig. 5

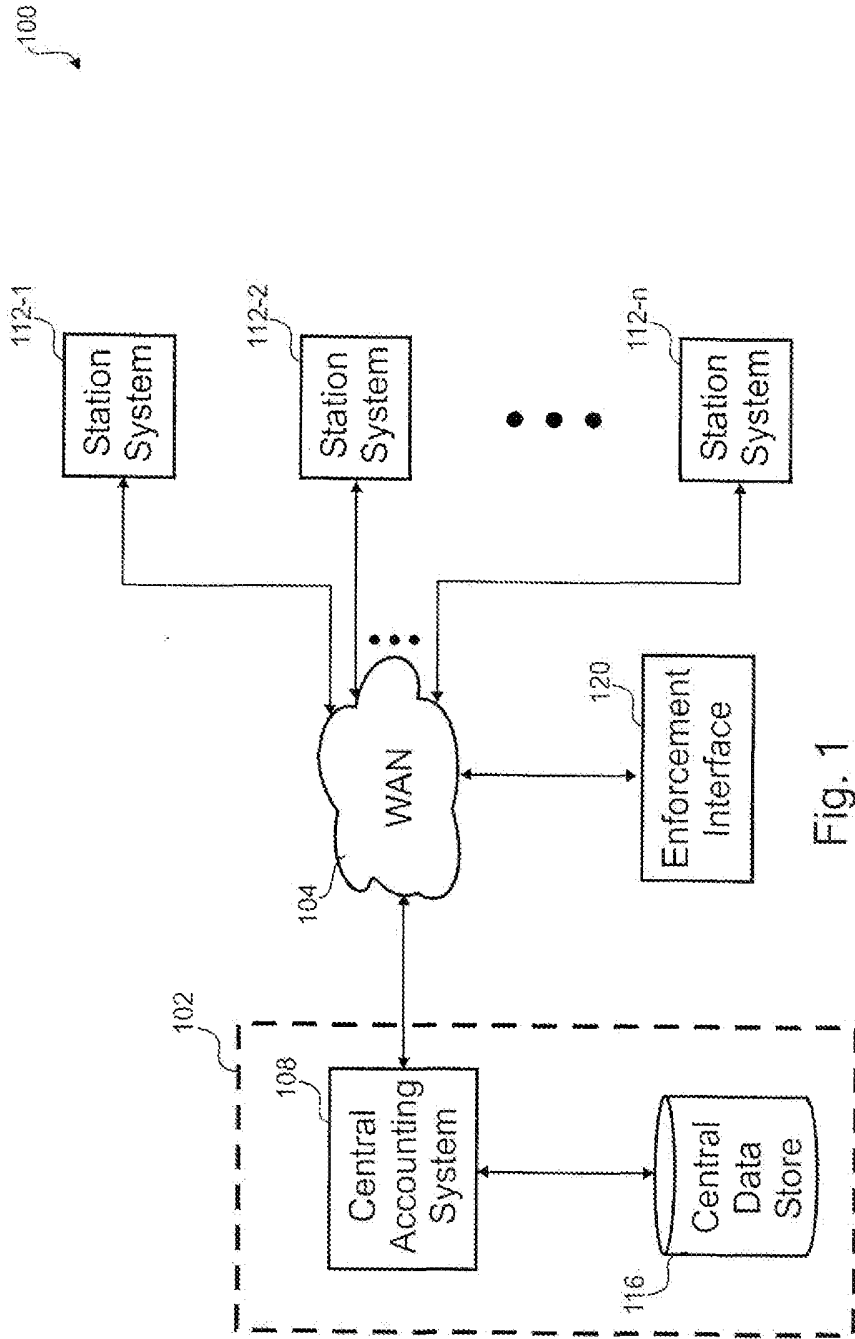


Fig. 1

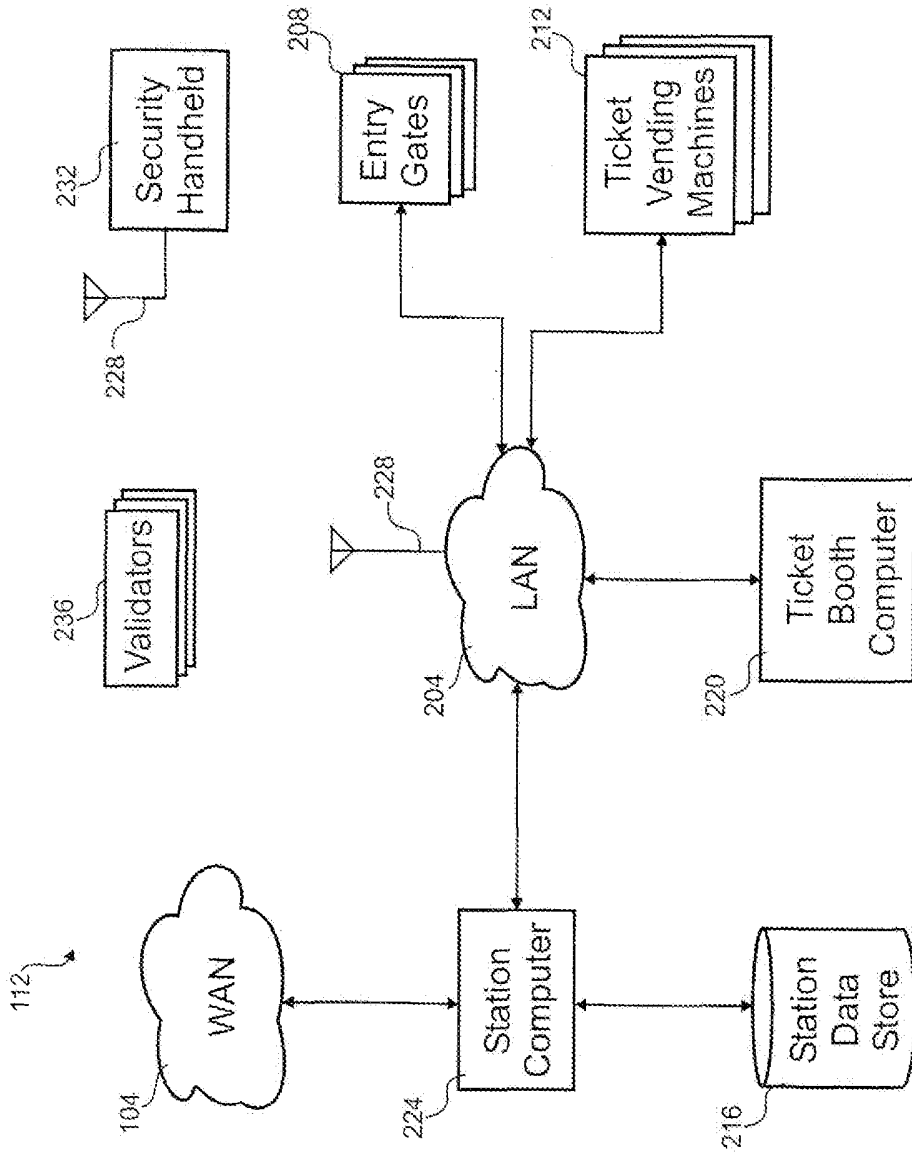


Fig. 2

212

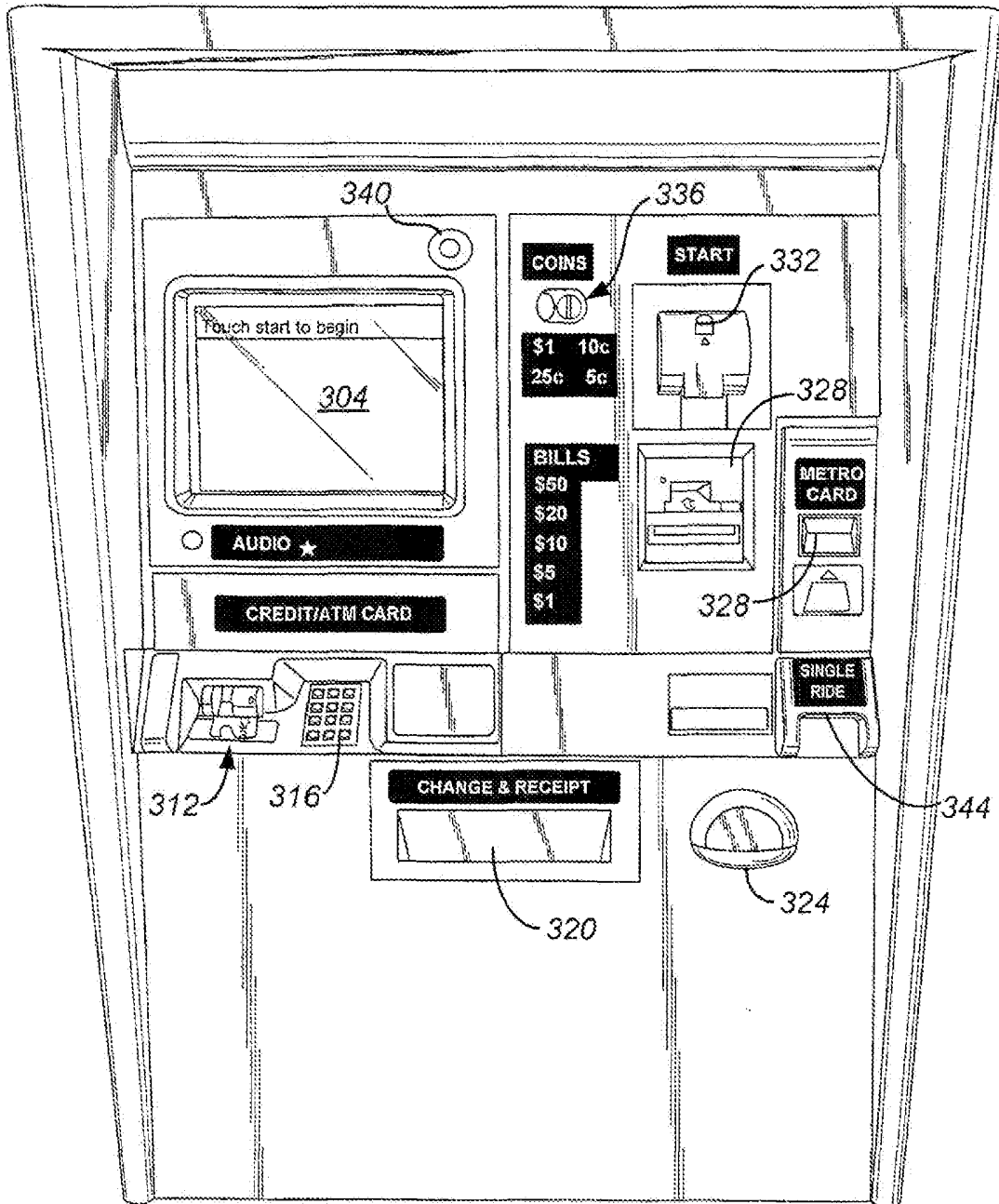


FIG. 3

212

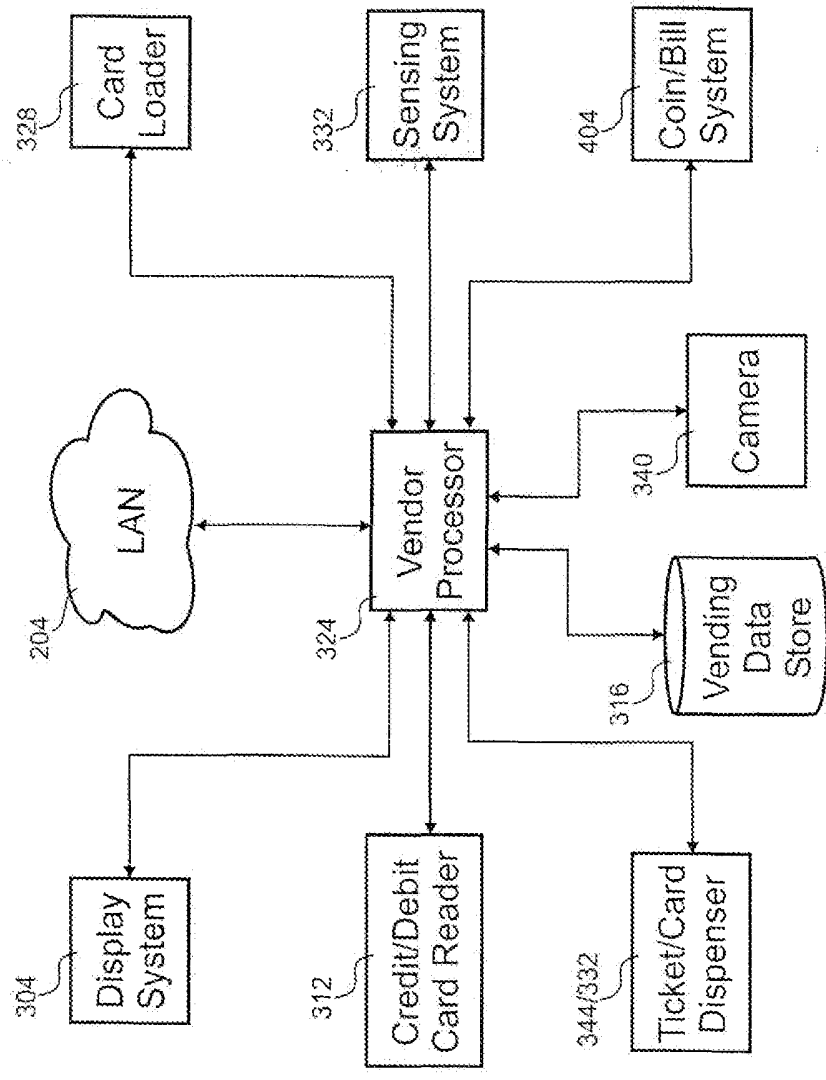


Fig. 4

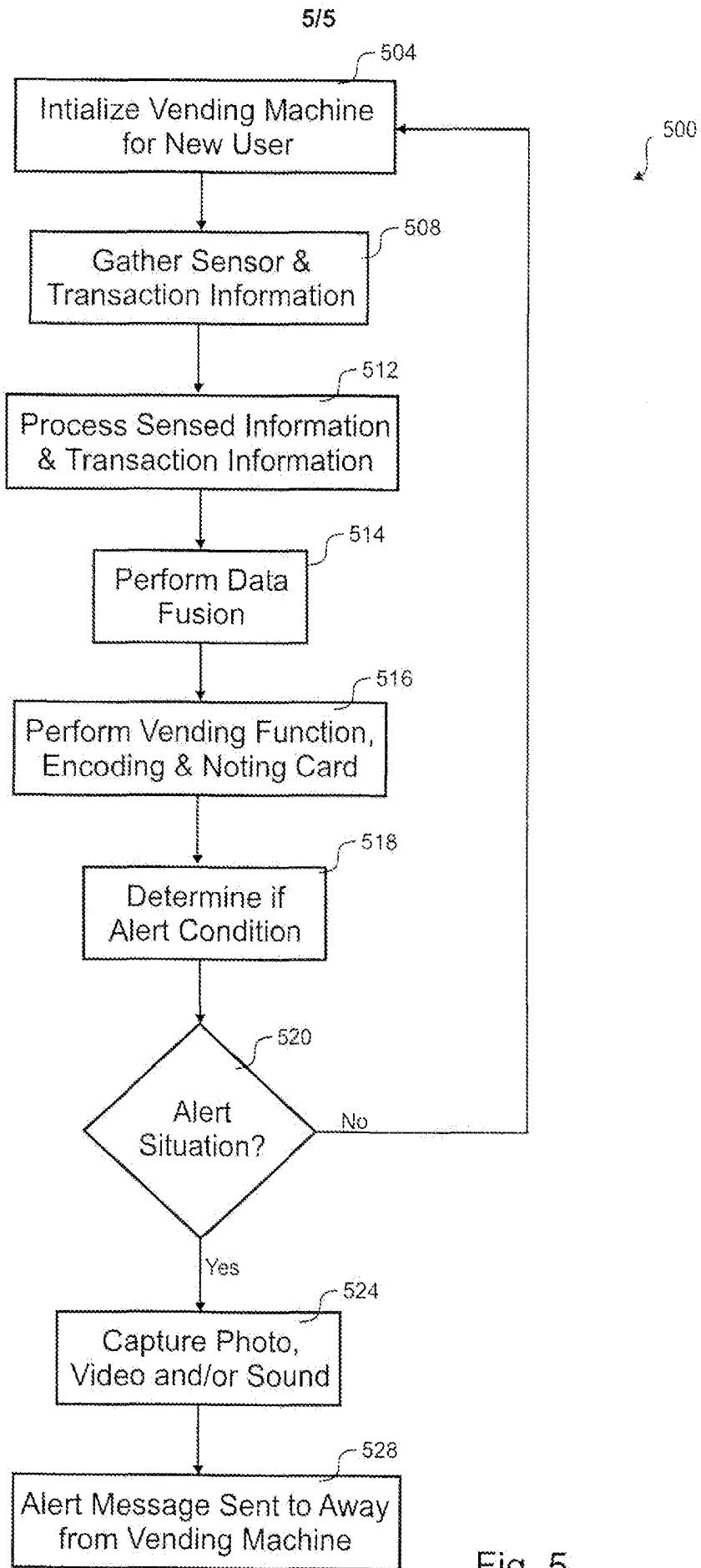


Fig. 5

AUTOMATIC INTEGRATED SENSING AND ACCESS CONTROL

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. Patent Application No. 12/948,313, filed November 17, 2010, which claims the benefit of U.S. Provisional Application No. 5 61/293,592, filed January 8, 2010, and U.S. Provisional Application No. 61/262,000, filed November 17, 2009; this application is a continuation-in-part of U.S. Patent Application No. 12/716,154, filed March 2, 2010, which is a continuation of U.S. Patent Application No. 12/062,390, filed April 3, 2008, which issued as U.S. Patent No. 7,677,449, which is a continuation of U.S. Patent Application No. 11/329,640, filed January 11, 2006, which issued as 10 U.S. Patent No. 7,367,494, which claims the benefit of U.S. Provisional Application No. 60/659,830, filed March 8, 2005; and this application is a continuation-in-part of U.S. Patent Application No. 12/123,387, filed May 19, 2008, which claims the benefit of U.S. Provisional Application No. 60/938,677, filed May 17, 2007, each of which is hereby incorporated by reference herein in its entirety.

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BACKGROUND

[0002] This disclosure relates in general to securing controlled areas and, but not by way of limitation, to automatic security systems used for controlled areas.

[0003] There are terrorism concerns in many contexts. Situations where people congregate have become attractive targets for those who plant bombs. Terrorists often rely upon forged 20 authentication documents such that knowing true identities is not possible. Additionally, terrorists seek out situations where they can anonymously gain access to large amounts of people to increase the impact of their bombs.

[0004] Airports have a long history of controlling access by persons with certain items that could aid hijacking an airplane. For example, airports have security checkpoints where metal 25 detectors are used on people and carry-on bags are searched. Some airports use X-ray machines on bags and chemical detectors on bags and people. These systems interrogate a bag or person without knowing the identity of the person being interrogated.

[0005] Security systems are used to secure areas. Things such as security codes, biometric information and/or identity cards are used to authenticate a person before authorizing entry to the secure area. In these circumstances, a known person is authenticated by way of the information provided. For example, a new person is added to the database of allowed persons along with the code from their identity card. When the identity card is provided, the person is allowed entry to the secured area.

[0006] Transit systems have been the subject of terrorist incidents. Suicide bombers have carried bombs into buses or trains. Additionally, bombs have been left in public transport by terrorists. Increased foot patrols have been used for transit systems to increase the likelihood of apprehending terrorists or bombs they have left behind. In some cases, canine officers are used to try to find those carrying explosives or the explosives themselves.

SUMMARY

[0007] In one embodiment, the present disclosure provides an access control system for sensing exposure to items of interest for a person associated with a unique identifier of a fare card or ticket. The access control system includes the unique identifier, an exposure detector and a processor. The unique identifier associated with the person that is flagged when exposure is detected. The exposure detector detects exposure to items of interest by the person. The processor is coupled to the exposure detector. The message is communicated away from the processor to a remote location when the unique identifier is flagged.

[0008] In another embodiment, the present disclosure provides an access control system for sensing exposure to items of interest for a person associated with an identifier that is machine-readable from a media. The access control system including an identifier, an exposure detector and a processor. The identifier associated with a person. The exposure detector detects exposure to items of interest by the person. The processor coupled to the exposure detector. When exposure is detected, the identifier is flagged and a message is communicated away from the processor to a remote location. The identifier is recognized at an access control point, where access beyond the access control point can be controlled.

[0009] In yet another embodiment, the present disclosure provides a method for flagging a person associated with a machine-readable identifier based, at least in part, upon exposure to at least one predetermined item. In one step, the identifier, associated with the person, is

recognized. The identifier corresponds with a card or ticket. The person is tested for exposure to at least one predetermined item. A point away from the testing of the identifier is notified of an outcome of the testing step.

5 [0010] Further areas of applicability of the present disclosure will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating various embodiments, are intended for purposes of illustration only and are not intended to necessarily limit the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present disclosure is described in conjunction with the appended figures:

10 FIG. 1 is a block diagram of an embodiment of a transit fare system;
FIG. 2 is a block diagram of an embodiment of a transit station system;
FIG. 3 depicts a perspective view of an embodiment of a ticket vending machine;
FIG. 4 is a block diagram of an embodiment of the ticket vending machine; and
15 FIG. 5 is a flow diagram of an embodiment of a process for processing a card holder with sensing of exposure to items of interest.

[0012] In the appended figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is
20 applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

DETAILED DESCRIPTION

[0013] The ensuing description provides preferred exemplary embodiment(s) only, and is not intended to limit the scope, applicability or configuration of the disclosure. Rather, the ensuing
25 description of the preferred exemplary embodiment(s) will provide those skilled in the art with an enabling description for implementing a preferred exemplary embodiment. It being understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope as set forth in the appended claims.

[0014] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits may be shown in block diagrams in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0015] Also, it is noted that the embodiments may be described as a process which is depicted as a flowchart, a flow diagram, a data flow diagram, a structure diagram, or a block diagram. Although a flowchart may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the operations may be re-arranged. A process is terminated when its operations are completed, but could have additional steps not included in the figure. A process may correspond to a method, a function, a procedure, a subroutine, a subprogram, etc. When a process corresponds to a function, its termination corresponds to a return of the function to the calling function or the main function.

[0016] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks may be stored in a machine readable medium such as storage medium. A processor(s) may perform the necessary tasks. A code segment or machine-executable instructions may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0017] Referring first to **FIG. 1**, a block diagram of an embodiment of a transit fare system 100 is shown. This embodiment is in the context of the transit fare system 100, which is a closed system where fare cards have a stored value and serial number associated with the card. In one embodiment, a contactless smart card is used for the fare card, but other embodiments could use serialized magnetic stripe cards, digital tokens, RFID tags, cell phone payment, government-

issued identity cards, smart cards with contacts, or any other portable device or card that has a unique identifier generally associated with a person. The user can add an amount or credit to the far card to allow further use in the transit fare system 100. The credits, debits and stored value can include a monetary credit, a usage credit and/or a usage period. A number of station systems 5 112 are distributed across the transit fare system 100 and generally correspond to the transit stations where the fare card might be used.

[0018] There is a central control system 102 that communicates with the various station systems 112 using a wide area network (WAN) 104 that may be public or private. The WAN 104 could be packet switched or circuit switched connections using telephone lines, coaxial 10 cable, optical fiber, wireless communication, satellite links, and/or other mechanisms for communication. Communication between the station systems 112 and the central control system 102 may be in real time or periodic. Usage of fare cards throughout the transit system 100 can be tracked. Additionally, sensed exposure to items of interest, photos and biometrics can be gathered throughout the station systems 112 and stored in the central data store 116. Fare cards 15 can be flagged by one station system 112-1 and passed to another station system 112-2 by way of the central control system 102.

[0019] The central control system 102 could have many more components, but only the components related to controlling access according to exposure to items of interest. When exposure is sensed at any of the station systems 112, the central control system 102 can notify 20 appropriate authorities through a law enforcement interface 120. The fare cards associated with persons who are likely to have been exposed to items of interest are flagged. The station systems 112 can be notified to prevent access and/or alert local police officers when the fare card is encountered. In some embodiments, fare cards with RFID tags can be read as a holder passes throughout the transit system 100. A flagged fare card can be tracked wherever used or sensed 25 within the system 100.

[0020] In this embodiment, a central accounting system 108 and a central data store 116 are shown for the central control system 102. The central accounting system 108 receives periodic reports upon how credits or debits are being processed throughout the system 100. Additionally, any sensed items of interest are transmitted to the central accounting system 108 in an alert 30 message. The alert message may also be sent the station computer, other stations, law enforcement, etc.

[0021] Table I shows an example of the alert message resulting from a sensed exposure of a card holder to an item of interest and data fusion. Data fusion is the accumulation of different types of information to make an intelligent decision for a particular transaction. In this example, a particular fare card is associated with a holder where nitrates were sensed at a particular time and date. The machine number could correspond to a vending machine, turnstile, or other machine that can sense the fare card serial number and an item of interest. A captured video clip of the holder is sent to the central data store 116.

Table I. Alert Message/Data Fusion Example

Field	Example
Machine Number	34sd82k
Encounter Date	07-21-08
Encounter Time	21:32:05
Fare Card Serial Number	23490782
Transaction Location	Fare Load
Transaction Type	Cash
Captured Info	Video
Sensed Item	Nitrates
Flag Status	Flagged

[0022] In another embodiment shown in Table II, another example of a fare card is shown where the holder is cleared for certain sensed items after data fusion. A turnstile (i.e., machine number 99k8645a) may have read the fare card (serial number 23489202) and sensed gun powder. In this case, the fare card is associated with a law enforcement officer in the data fusion process such that sensing gun powder from a weapon is found to be not unusual and does not result in flagging. Even though a picture is captured, the holder is cleared such that it may not be retained. The transit system 100 could still track the holder to know where the law enforcement officer is located.

Table II. Alert Message/Data Fusion Example

Field	Example
Machine Number	99k8645a
Transaction Date	09-28-06

Transaction Time	00:02:05
Fare Card Serial Number	23489202
Transaction Location	Turnstyle
Transaction Type	Debit Card
Captured Info	Photo
Sensed Item	Explosives
Flag Status	Cleared

These items listed in Tables I and II are an example of some of the items that can be used in the data fusion process that may allow a more intelligent decision than any of the items taken by themselves. Additionally, usage history of the fare card, past detection of items of interest, past transactions, security alerts, and any identity information (e.g., credit card information), could also be used along with information gathered from the present transaction in determining whether a fare card should be flagged.

[0023] The central accounting system 108 receives all these alert messages and updates a record for each fare card in the central data store 116. Subsequent system 100 interaction with the fare card that has an alert message results in the transit fare system 100 sending a further alert message. In addition to the central accounting system 108, the station system 112 may alert officers and other machines to the card holder of interest.

[0024] The central control system 102 and/or station systems can perform data mining on fare cards and tickets stored in their systems. Where a credit card or government issued identification is associated with a fare card or ticket, information from previous transactions and other information can be stored to take advantage of the data fusion to increase accuracy in eliminating false negatives and positives. For example, traces of nitrates found for the tenth time on a farmer could eliminate further alerts when nitrates are sensed on that same card holder. In another example, cash purchases of expensive tickets could be more prone to alert if something is sensed under the presumption that a terrorist may be more likely to pay in cash. Tickets purchased at the same time can be tied together such that if one is flagged by an alert, all could be flagged.

[0025] With reference to **FIG. 2**, a block diagram of an embodiment of a transit station system 112 is shown. Various transit stations may have some or all of the components shown in the

block diagram. A local area network (LAN) 204 couples the various systems together and could include point-to-point connections, packet switched connections, wireless connections, and/or other networking techniques.

5 [0026] A station computer 224 is coupled to the WAN 104 to allow communication with the central accounting system 108. Processing of local information is performed on the station computer 224. For example, video surveillance for the station could be accessible from the station computer along with transit schedule information. Alert messages could be routed by the station computer 224 to the central accounting system 108 and other places within the station. Some embodiments could track a card associated with a holder where exposure to an item of
10 interest was detected. This could include RFID sensing, video surveillance, encounters a turnstiles and ticket counters.

[0027] A station data store 216 stores various information used by the station system 112. Alert messages and black listed fare card serial messages are stored in the station data store 216. A ticket booth computer 220, entry gates 208, and TVMs 212 all communicate with the central
15 accounting system 108 through the station computer 224. Some embodiments refer back to the central accounting system 108 for alerts for a particular fare card during an encounter. Other embodiments store fare card serial numbers in the station data store 216, which could be updated on a regular basis to reflect other encounters throughout the transit system 100. Any captured video, pictures and/or audio for a holder of interest could also be held on the station data store
20 216.

[0028] In this embodiment, the entry gates 208, ticket booths and TVMs 212 can determine transaction type (e.g., credit, debit or cash), a serial number of the card and sense exposure to items of interest. Other embodiments could have sensing stations that sense the serial number of the card with RFID and sense for exposure to items of interest from an air current or plume that
25 passes over the holder. When an entry gate 208, ticket booth or TVMs 212 triggers on exposure to an item of interest, an alert message is sent to the station computer 224 for distribution within the station and possibly throughout the transit fare system 100. For example, the card holder may approach a human ticket vendor to purchase a ticket. The card holder could be sensed and any ticket(s) purchased could be flagged in an alert message as being associated with the card
30 holder.

[0029] In some embodiments, the entry gate 208 could serve to prohibit entry to a holder associated with an alert. The entry gate 208 could have received an alert message or produced its own alert message for a card holder. An error message, such as "invalid ticket," could be produced on the entry gate 208 when entry fails such that a holder would likely go to a ticket booth to straiten-out the problem. In some embodiments, a silent alarm could be used such that the card holder is passed by the entry gate 208, but flagged for remedial action.

[0030] Security handhelds 232 wirelessly communicate through antennas 228 using the LAN. Other embodiments could also include wired security handhelds 232. Ticket booth computers 220 also communicate with the LAN 204. Transit workers and security officers could each have one of these ticket booth computers 220 or security handhelds 232 to receive alert messages. For example, when a TVM 212 senses that a holder was exposed to an item of interest, the alert message is sent to the station computer 224 and relayed to the security handhelds 228 and ticket booth computers 220. A user of these computers 220, 228 can pull up pictures, video and sound stored in the station data store. Any tracking of the card holder could be updated on the computer 220, 228 to allow a coordinated response to the alert situation.

[0031] In transit systems 100, there are often card validators 236 that are wirelessly or periodically connected to the station computer. For example, these validators 236 could be bar code readers held by train conductors or at the entrance to busses. These validators 236 could also perform sensing for exposure to items of interest and produce alert messages. The conductor or bus driver could be notified of an alert message produced for a card holder even if there is no current communication with the station computer 224. In various embodiments, the items of interest could include chemical compounds, nuclear materials, radiological material, biological agents, and/or explosives.

[0032] Referring next to **FIGs. 3 and 4**, a perspective view and block diagram of an embodiment of a ticket vending machine 212 are shown. Tickets and fare cards can be purchased and/or recharged at the ticket vending machine 212. A coin/bill system 404 and credit/debit card reader 312 are used to input value to purchase more fares and credits. A coin slot 336 and bill loader 328 are used to accept cash. Change is along with a receipt in a change/receipt slot 320 and coin return 324. A pin pad 316 is provided adjacent to the credit/debit card reader to enter numerical information such as a pin code for a debit card.

[0033] A display system 304 prompts the card holder through the refill/purchase process. For example, the screen prompts the purchaser to touch the start pad 332 to begin the process. A serialized card can be input into a recharge slot 328 or a new card issued. Single ride tickets can be issued through another slot 344. Whenever the holder enters something into the ticket vending machine 212, it can be tested for exposure to an item of interest. For example, credit/debit cards, serialized card for recharge, bills, and coins can all be tested for residue by the ticket vending machine. As is well known, the money supply can be contaminated by certain chemicals such that an alert might not be triggered, but radiation sensed on the money could trigger an alert.

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[0034] In this embodiment, the start pad 332 is tied to an ion mass spectrum device that can detect exposure to chemical, biological and/or explosives. Other embodiments could use an air flow to detect residue from a plume emanating from the card holder. Some embodiments could detect residue from the holder's interaction with a touch screen over the display. Any contact or plume that can be tied to the card holder can be analyzed.

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[0035] Some embodiments use biometric matching to identify the card holder. Where a biometric is matched, the serial number of the card or ticket can be tied to the biometric. For example, the start pad 332 may do fingerprint analysis. A video or still camera 340 could do facial recognition. Any biometric information can assist the data fusion process.

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[0036] The video or still camera 340 can record picture(s) of the card holder. Where there is no alert, the picture(s) could be discarded after some period of time. If an alert is raised or some other level of suspicion, the captured picture(s) and any audio can be forwarded throughout the station system 112 and/or communicated with the central control system 102. Generally, all further pictures and sound capable of capture is held where a card or ticket is subject to an alert.

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[0037] Referring next to FIG. 5, a flow diagram of an embodiment of a process for processing a card holder is shown where there is sensing of exposure to items of interest. The depicted portion of the process begins in block 504 where the TVM 212 is configured for a new card holder. Sensor information is gathered in block 508. The sensor information could be from cards, money, touch of the card holder, plume from the card holder, and/or non-touch radiological sensing. Additionally, transaction information is gathered in step 508 such as credit/debit card, type of fare, amount, etc. The gathered information is processed in block 512, which may involve assigning a new unique identifier to a new fare card. Data fusion is

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performed in block 514 to determine if there has likely been exposure to an item of interest. Block 514 may use various information gathered by the TVM 212 in this transaction, but could also query the station computer 224 for additional information, could query the central control system 102, credit/debit clearing databases, and/or law enforcement or governmental databases.

5 **[0038]** In block 516, the vending function is performed to recharge or issue a card or ticket. The card or ticket has a unique serial number unique associated with it that can be attributed to the holder of the card even though the identity of the holder may not be known. Purchase information, the unique identifier, transaction history, alert condition and/or other information can be encoded on the fare card in block 516. In block 518, it is determined if the card holder
10 should be flagged with an alert based upon the data fusion and possible other factors. This analysis could be done local to the TVM 212 or could interact with the station computer 224, law enforcement systems, and/or central control system 102 in various embodiments. Some embodiments do not have real-time access to data fusion information and only determine if there was exposure or not. Other parts of the fare system 100 determine if transit employees and
15 security officers should be notified after analysis of the data fusion. If there is no alert in block 520, processing loops back to block 504 where the TVM 212 readies for the next customer.

[0039] Where an alert situation is determined processing goes from block 520 to block 524. Photo(s), video, and/or sound is captured to document the card holder in block 524. Some
20 embodiments temporarily store the photo(s), video and/or sound prior to the alert determination and only save that information if an alert is determined. In block 528, an alert message is sent away from the TVM 212 to the station computer 224, law enforcement, security handhelds 232, and/or central control system 102. Further analysis may be performed remotely before alerting entry gates 208, other TVMs 212, law enforcement, other stations, transit vehicle operators, security handhelds 232, and/or ticket booths. This further analysis could be done manually
25 and/or automatically. In some cases, for example, other law enforcement is automatically and/or manually notified.

[0040] A number of variations and modifications of the disclosed embodiments can also be used. For example, the flagging of card serial numbers as being associated with a holder
30 exposed to an item of interest need not be limited to transit systems. The serial number could be an event ticket, a government issued identity card, and/or employee badge. Non-barriered things

could be given access to, for example, a train station where conductors can validate tickets and sense for exposure in addition to the vending systems.

5 [0041] The techniques described herein may be implemented by various means. For example, these techniques may be implemented in hardware, software, or a combination thereof. For a hardware implementation, the processing units may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, other electronic units designed to perform the functions described herein, or a combination thereof.

10 [0042] For a software implementation, the techniques, processes and functions described herein may be implemented with modules (e.g., procedures, functions, and so on) that perform the functions described herein. The software codes may be stored in memory units and executed by processors. The memory unit may be implemented within the processor or external to the processor, in which case it can be communicatively coupled to the processor via various means
15 as is known in the art.

[0043] While the principles of the disclosure have been described above in connection with specific apparatuses and methods, it is to be clearly understood that this description is made only by way of example and not as limitation on the scope of the disclosure.

WHAT IS CLAIMED IS:

- 1 1. A transit system for sensing exposure to an item of interest, the transit
2 system comprising:
3 a unique identifier of a media;
4 an exposure detector that detects exposure of the media to the item of interest,
5 wherein the exposure detector determines whether the media has been exposed to the item of
6 interest based, at least in part, on a detected optical change in a detection material of the media;
7 a processor coupled to the exposure detector, wherein:
8 the unique identifier is flagged when the exposure to item of interest is
9 detected, and
10 a message is communicated away from the processor to a remote location
11 when the unique identifier is flagged; and
12 an access control point that:
13 automatically reads the unique identifier of the media, and
14 denies access beyond the access control point based, at least in
15 part, on a determination that the unique identifier is flagged.
- 1 2. The transit system for sensing exposure to the item of interest as recited in
2 claim 1, wherein the detected optical change in the detection material includes one or both of a
3 change in color and a change in reflective photoluminescence.
- 1 3. The transit system for sensing exposure to the item of interest as recited in
2 claim 1 or claim 2, wherein data beyond that gathered by the exposure detector's interaction with
3 the media is used in determining if the unique identifier is flagged.
- 1 4. The transit system for sensing exposure to the item of interest as recited in
2 any one of the preceding claims, further comprising an encoder for storing information on the
3 media.
- 1 5. The transit system for sensing exposure to the item of interest as recited in
2 any one of the preceding claims, wherein the item of interest comprises a chemical compound,
3 nuclear material, radiological material, biological agent, or explosive.

1 6. The transit system for sensing exposure to the item of interest as recited in
2 any one of the preceding claims, further comprising an image capture device.

1 7. The transit system for sensing exposure to the item of interest as recited in
2 any one of the preceding claims, wherein the media comprises a fare card or ticket.

1 8. A system for sensing exposure to items of interest for a person associated
2 with an identifier that is machine-readable from access control media, the system comprising:
3 the identifier of the access control media associated with the person, the identifier
4 being machine readable from the access control media;

5 an exposure detector that detects whether the access control media has been
6 exposed to one or more items of interest based, at least in part, on a detected optical change in a
7 detection material of the media;

8 a processor coupled to the exposure detector, wherein:

9 the identifier is flagged when the exposure to one or more items of interest
10 is detected, an exposure condition being stored by the access control media, and

11 a message is communicated away from the processor to a remote location
12 when the identifier is flagged; and

13 an access control point that reads the identifier of the access control media,
14 wherein the unique identifier is used, at least in part, to determine whether to allow access
15 beyond the access control point.

1 9. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in
3 claim 8, wherein the detected optical change in the detection material includes one or both of a
4 change in color and a change in reflective photoluminescence

1 10. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in
3 claim 8 or claim 9, wherein the association between the person and the identifier is that the
4 person possesses the access control media.

1 11. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in any
3 one of claims 8 to 10, wherein the items of interest comprise at least one of chemical
4 compounds, nuclear materials, radiological material, biological agents, or explosives.

1 12. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in any
3 one of claims 8 to 11, further comprising an image capture device.

1 13. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in any
3 one of claims 8 to 12, wherein the exposure detector detects exposure to the items of interest
4 from the person's contact to the access control media.

1 14. The system for sensing exposure to items of interest for a person
2 associated with an identifier that is machine-readable from access control media as recited in any
3 one of claims 8 to 13, wherein the access control media comprises a fare card or ticket.

1 15. A method for flagging a media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest, the method
3 comprising:
4 providing a machine-readable identifier associated with the media;
5 determining if the media was exposed to the at least one predetermined item of
6 interest based, at least in part, on a detected optical change in a detection material of the media;
7 flagging the machine-readable identifier when the determining results in a
8 determination that there was exposure to the at least one predetermined item of interest;
9 notifying a point away from a location where the machine-readable identifier was
10 provided that the machine-readable identifier is flagged;
11 automatically reading information from the media; and
12 controlling access of a person based, at least in part, on whether the machine-
13 readable identifier is flagged.

1 16. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest as recited in claim 15,

3 wherein the detected optical change in the detection material includes one or both of a change in
4 color and a change in reflective photoluminescence.

1 17. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest as recited in claim 15
3 or 16, wherein at least two of the elements are performed by a device configured to do at least
4 one of read, write, or verify information from the media.

1 18. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest as recited in any one of
3 claims 15 to 17, wherein the media comprises a fare card or ticket.

1 19. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest as recited in any one of
3 claims 15 to 18, wherein the providing the machine-readable identifier comprises reading a
4 magnetic stripe, RFID, smart card, bar code, and/or optical indicator of the media.

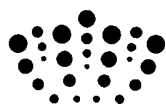
1 20. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest as recited in any one of
3 claims 15 to 19, wherein the predetermined item of interest comprises at least one of chemical
4 compounds, nuclear materials, radiological material, biological agents, or explosives.

1 21. A method for flagging an media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item at least one as recited in any one
3 of claims 15 to 20, wherein the determining includes detection of whether the media has been
4 exposed to the at least one predetermined item from the person's contact with the media.

1 22. A transit system constructed and arranged substantially as hereinbefore
2 described or as illustrated in any one of the accompanying drawings.

1 23. A system for sensing exposure to items of interest for a person associated
2 with an identifier that is machine-readable from access control media constructed and arranged
3 substantially as hereinbefore described or as illustrated in any one of the accompanying
4 drawings.

1 24. A method for flagging a media used in an access control system based, at
2 least in part, upon exposure to at least one predetermined item of interest, substantially as
3 hereinbefore described or as illustrated in any one of the accompanying drawings.



Application No: GB1205143.9

Examiner: Mr Andrew Hole

Claims searched: 1-21

Date of search: 28 June 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-21.	WO 2009/021236 A1 (CUBIC CORP.) Please see drawings, abstract and paragraphs 2-7, 30-39 and 70-73 in particular. The access control system, which can be for a mass transit system, can detect exposure of a media to CBRNE through a colour reactive media and an event triggered if exposure is detected.
Y	1-21.	WO 2006/096246 A1 (CUBIC CORP.) Please see whole document.
Y	1-21.	WO 2009/025894 A2 (CUBIC CORP.) Please see paragraph 5 in particular.
A	-	WO 03/091945 A1 (INTELLIGENT DEVICES) Please see background of the invention.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

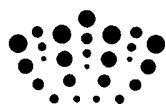
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

G01N; G07C

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, TXTE



International Classification:

Subclass	Subgroup	Valid From
G07C	0009/00	01/01/2006
G01N	0021/25	01/01/2006
G01N	0021/64	01/01/2006
G07B	0015/00	01/01/2011