(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 704 106 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.03.2014 Bulletin 2014/10

(51) Int Cl.:
G07C 9/00 *(2006.01)*

(21) Application number: **12182614.3**

(22) Date of filing: **31.08.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Inventio AG**
6052 Hergiswil (CH)

(72) Inventor: **Schuster, Kilian**
6020 Emmenbrücke (CH)

(74) Representative: **Blöchle, Hans et al**
Inventio AG,
Seestrasse 55
Postfach
6052 Hergiswil (CH)

(54) Command input using multiple data carriers

(57) A command can be input into a system (100) using two or more data carriers (130, 132) such as, for example, two or more cards in combination. The command is determined based on the particular combination of the data carriers. Different commands can be input by changing the combination of the data carriers.

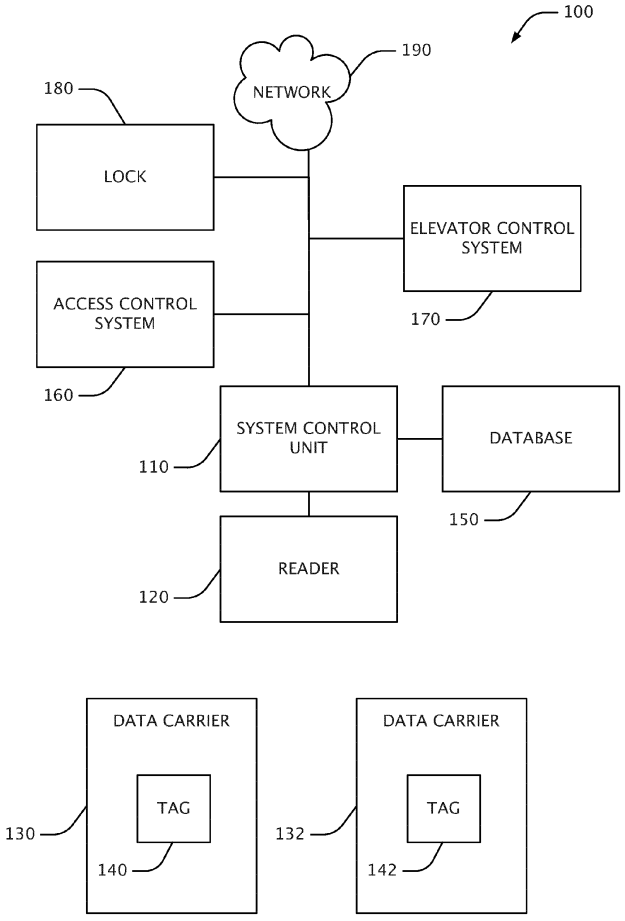

FIG. 1

EP 2 704 106 A1

Description

[0001] This disclosure relates to inputting commands into electronic and computer-based devices.

[0002] Electronic and computer-based systems often receive commands from users. For example, an access control system may receive a command to open a door. As another example, an elevator control system may receive a command to send an elevator car to a particular floor. Such commands can be input using, for example, a button on a panel or another interface.

[0003] US20110100762A1 describes, among other things, an electronic door trim with command buttons.

[0004] Further options for the input of commands into systems could be advantageous. This is addressed herein by at least some of the embodiments covered by the claims.

[0005] A command can be input into a system using two or more data carriers such as, for example, two or more cards in combination. The command is determined based on the particular combination of the data carriers. Different commands can be input by changing the combination of the data carriers.

[0006] Some embodiments of a method comprise: contactlessly detecting a first data carrier using a data-carrier reader; contactlessly detecting a second data carrier using the data-carrier reader; and selecting, using a computer-based system control unit, one of a plurality of possible commands associated with respective data carrier combinations, the selected command being associated with a combination of the detected first and second data carriers. The method can further comprise sending the selected command to an elevator system, an access control system, or a lock. The method can further comprise providing a plurality of data carriers, the plurality of data carriers comprising the first and second data carriers, and selecting the first and second data carriers for inputting the selected command. In some cases, the data carriers are detected using an anti-collision system. In some cases, the detecting of the first data carrier and the detecting of the second data carrier is performed simultaneously or approximately simultaneously.

[0007] Some embodiments of a system comprise a data-carrier reader and a computer-based control unit coupled to the data-carrier reader, the computer-based control unit being programmed to perform a method, the method comprising, contactlessly detecting a first data carrier using the data-carrier reader, contactlessly detecting a second data carrier using the data-carrier reader, and selecting one of a plurality of possible commands associated with respective data carrier combinations, the selected command being associated with a combination of the detected first and second data carriers. The first data carrier can be embedded in a first card and the second data carrier can be embedded in a second card. The first data carrier can comprise a radio-frequency identification tag or an optical code. An elevator control system, a lock, or an access control system can be coupled to the computer-based control unit.

[0008] Further embodiments comprise a computer-based device configured to perform one or more of the disclosed methods.

[0009] At least some embodiments of the disclosed methods can be implemented using a computer or computer-based device that performs one or more method acts, the computer or computer-based device having read instructions for performing the method acts from one or more computer-readable storage media. The computer-readable storage media can comprise, for example, one or more optical disks, volatile memory components (such as DRAM or SRAM) and/or nonvolatile memory components (such as hard drives, Flash RAM or ROM). The computer-readable storage media do not cover pure transitory signals. The methods disclosed herein are not performed solely in the human mind.

[0010] The disclosure refers to the following figures, in which:

FIG. 1 shows a block diagram of an exemplary embodiment of a system.

FIG. 2 shows a block diagram of an exemplary embodiment of a method for inputting a command.

FIG. 3 shows a block diagram of an exemplary embodiment of a method for receiving a command.

FIG. 4 shows a signal diagram for an exemplary exchange of signals in a system.

FIG. 5 shows a block diagram of an exemplary embodiment of a computer.

[0011] FIG. 1 shows a block diagram of an exemplary embodiment of a system 100. The system 100 comprises a computer-based system control unit 110, which is programmed to perform one or more of the method acts described herein. The system control unit 110 is communicatively coupled to at least one reader 120. The reader 120 is configured to contactlessly read information from one or more data carriers 130, 132. In some embodiments, the reader 120 comprises a radio-frequency identification (RFID) reader. In further embodiments, the reader 120 comprises a near-field communication (NFC) reader or a far-field communication reader. In other embodiments, the reader 120 comprises an optical code reader.

[0012] Each of the data carriers 130, 132 is a physical object that stores machine-readable information. In at least some embodiments, the data carriers 130, 132 comprise respective RFID tags 140, 142. In various embodiments, passive tags and/or active tags can be used. In further embodiments, the data carriers 130, 132 each comprise an optical code (e.g.: a one-dimensional code, such as a bar code; a two-dimensional code, such as a QR code; or another machine-readable image). The data

carriers 130, 132 can have various form factors. For example, the data carriers 130, 132 can be shaped like a credit card, they can be shaped like a key fob, or they can have another shape. The reader 120 reads information from the tags 140, 142. In some embodiments, the data carriers 130, 132 are at least partially labeled (e.g., with text, colors, and/or images) to identify the data carriers 130, 132 to the user.

[0013] The system control unit 110 can also be communicatively coupled to one or more other components. The control unit 110 can be coupled to a database 150, which stores information about, for example, users, user access times, and user access zones. The control unit 110 can also be coupled to an access control system 160 (e.g., a security system) for an area and/or a building. The control unit 110 can also be coupled to an elevator control system 170. The control unit 110 can also be coupled to a lock 180, which controls access to a building, a room, a floor, a storage space, a garage and/or another area. The control unit 110 can also be coupled to a network 190, which allows the control unit 110 to exchange information with one or more other electronic devices. The other electronic devices can be located remotely and/or locally relative to the control unit 110.

[0014] In various embodiments, the system 100 is located within a building. In further embodiments, the system 100 can also be located in and used within areas larger than a building and areas smaller than a building. For example, the system 100 could be used across a relatively large area, such as a campus, city, country or another large area. In such cases, at least some of the components are located remotely from each other. In other cases, the system 100 is used within a floor of a building, within a room of a building, or within two or more neighboring buildings. In some cases, the system 100 is integrated into a door, into a lock housing or into an area near a door.

[0015] In various embodiments, one or more of the components of the system 100 comprise energy-saving features. For example, the components can enter a low-energy or "standby" mode during an actual or expected low-use period. This can reduce energy consumption and, in cases where the components rely at least partially on battery power, extend the life of the battery. In some cases, the lock 180, for example, can enter a standby mode after a period of disuse and then exit the standby mode in response to movement of a door handle or other component.

[0016] In some embodiments where the tags 140, 142 each comprise RFID tags, the tags 140, 142 can each operate on the same frequency or about the same frequency. In further embodiments, the tags 140, 142 each operate on different frequencies, and the reader 120 is configured to read tags using multiple radio frequencies.

[0017] In some embodiments where the tags 140, 142 comprise optical codes, the codes can have the same format, or they can have different formats.

[0018] FIG. 2 shows an exemplary embodiment of a method 200 for inputting a command. The method 200 can be performed using, for example, an embodiment of the system 100. In a method act 210, a user selects a first data carrier. This could be, for example, a first RFID card. In a method act 220, the user selects a second data carrier. This could be, for example, a second RFID card. The first and second data carriers are selected according to a particular command that the user wishes to input. In a method act 230, the user places both the first and second data carriers in range of a reader coupled to an electronic system, so that the reader can detect information stored on the data carriers. The phrase "in range of" the reader means that the data carrier is close enough to the reader for the reader to recognize the presence of the data carrier and read information from it. The range can vary according to the embodiment. Possible ranges include, for example, a few millimeters, a few centimeters, less than 1 meter, about 1 meter, 3 meters, 5 meters, 10 meters, or another distance. Using the combined data carriers, the user communicates the desired command to the electronic system.

[0019] FIG. 3 shows an exemplary embodiment of a method 300 for receiving a command. The method 300 can be performed using, for example, an embodiment of the system 100. In a method act 310, a system control unit detects a first data carrier using a reader. For example, the system control unit can detect a first RFID card that is within range of the reader. Generally, "detecting" a data carrier comprises reading information from the data carrier that allows the data carrier to be differentiated from at least one other data carrier. In various embodiments, such differentiating information can comprise, for example, a number, a string, a name, a number sequence and/or another type of information.

[0020] In a method act 320, the system control unit detects a second data carrier using the reader. For example, the system control unit can detect a second RFID card that is within range of the reader. In a method act 330, the system control unit determines which command is associated with the combination of the first and second data carriers. For example, if the first and second data carriers are "Card A" and "Card B," then the associated command is "Command X." However, if the first and second data carriers are "Card B" and "Card C," then the associated command is "Command Y."

[0021] The commands that can be determined vary according to the particular embodiment. Possible commands include, for example: lock a door; unlock a door; call an elevator to pick up the user; open a door for a visitor; send an elevator to pick up a visitor; and/or other commands.

[0022] In at least some embodiments, the method acts 310, 320 are performed simultaneously or approximately simultaneously. By "approximately simultaneously" is meant, for example, in rapid succession. In such cases, the first and second data carriers are detected within 10 milliseconds of each other, within 100 milliseconds of each other, within 0.5 seconds of each other, within 1

second of each other, or within another amount of time. When the first and second data carriers are detected approximately simultaneously, it often appears to a human user that they are detected simultaneously.

[0023] In some embodiments, the system control unit sends the determined command to another system component in a method act 340. For example, if the selected command is an elevator command (e.g., "call the elevator"), the system control unit sends the command to the elevator control system. If the selected command is an access control command (e.g., "unlock a door for a visitor"), the system control unit sends the command to the access control system.

[0024] FIG. 4 shows a signal diagram for an exemplary exchange of signals in a system, such as an embodiment of the system 100. A data signal 410 is sent from a first data carrier to a reader and a system control unit coupled to the reader. A data signal 420 is sent from a second data carrier to the reader and the system control unit. The signals 410, 420 are sent simultaneously or approximately simultaneously. Based on the received signals, the system control unit identifies the first and second data carriers and determines a command associated with them. In a command signal 430, this command is sent to another system component for execution by the system component.

[0025] In various embodiments, a data signal is sent by a data carrier in response to a signal that is first sent by the reader (sometimes called an "interrogation signal"). This can be the case if, for example, the data carrier is a passive RFID tag. For clarity, such additional signals sent by the reader are not shown in FIG. 4.

[0026] FIG. 5 shows a block diagram of an exemplary embodiment of a computer 500 (e.g., part of a lock system, part of a system control unit, part of an elevator control system, part of an access control system, part of a reader, part of a database) that can be used with one or more technologies disclosed herein. The computer 500 comprises one or more processors 510. The processor 510 is coupled to a memory 520, which comprises one or more computer-readable storage media storing software instructions 530. When executed by the processor 510, the software instructions 530 cause the processor 510 to perform one or more method acts disclosed herein. Further embodiments of the computer 500 can comprise one or more additional components. The computer 500 can be connected to one or more other computers or electronic devices through an input/output component (not shown). In at least some embodiments, the computer 500 can connect to other computers or electronic devices through a network 540. In particular embodiments, the computer 500 works with one or more other computers, which are located locally and/or remotely. One or more of the disclosed methods can thus be performed using a distributed computing system.

[0027] In any of the disclosed embodiments, an identification feature can be used. For example, the lock system can compare data read from the data carrier with a list of data for authorized users to determine if the user associated with the data carrier is authorized to perform a given command. Alternatively, the lock system can first require that a user input authorization information, possibly using an additional data carrier.

[0028] At least some of the disclosed embodiments can provide additional ways for a user to input a command into an electronic system. Such embodiments can be helpful to, for example, a user who cannot operate buttons or other types of user interfaces, possibly due to a handicap. Physically touching the interface can also be avoided, which can help reduce the spread of dirt or disease.

[0029] In one non-limiting example, a user lives in a high-rise apartment building. The user's apartment door has an electronic lock, including a system control unit, which is contained in a lock housing. Three commands can be input into the lock: lock/unlock the door; call an elevator car to the floor of the user's apartment; and send an elevator car to the building lobby to pick up a guest and bring the guest to the user's floor. The user knows that a guest has just arrived in the lobby, and the user wishes to send the elevator to pick up the guest. The user selects first and second credit-card-sized RFID cards and holds them within a few centimeters of the lock housing, which contains an RFID reader. Upon detecting the two cards, the lock determines that this combination of cards is associated with the command to send the elevator car to the building lobby to pick up the guest. Accordingly, the system control unit sends this command to an elevator system control in the apartment building. After the elevator brings the guest to the user's floor, the user wishes to unlock the apartment door to let the guest in. To issue this command, the user selects the second RFID card and a third RFID card and holds these cards together near the reader of the electronic lock. The lock detects the two cards and determines that the command associated with this combination is the door-unlock command. Accordingly, the system control unit unlocks the door lock.

[0030] Although at least some of the disclosed embodiments are described as detecting combinations of two data carriers, any of the disclosed embodiments can be adapted to detect combinations of three data carriers, four data carriers, five data carriers, six data carriers, or another number of data carriers. In some embodiments, at least some commands can also be input using only one data carrier.

[0031] Any of the disclosed embodiments that use radio-based detection of the data carriers can be adapted to use one or more anti-collision techniques.

[0032] Although some embodiments of the various methods disclosed herein are described as comprising a certain number of method acts, further embodiments of a given method can comprise more or fewer method acts than are explicitly disclosed herein. In additional embodiments, method acts are performed in an order other than as disclosed herein. In some cases, two or more

method acts can be combined into one method act, and/or one method act can be divided into two or more method acts.

[0033] As used herein, a "user" can be a person, a group of persons, a machine and/or an animal.

[0034] Having illustrated and described the principles of the disclosed technologies, it will be apparent to those skilled in the art that the disclosed embodiments can be modified in arrangement and detail without departing from such principles. In view of the many possible embodiments to which the principles of the disclosed technologies can be applied, it should be recognized that the illustrated embodiments are only examples of the technologies and should not be taken as limiting the scope of the invention. Rather, the scope of the invention is defined by the following claims and their equivalents. I therefore claim as my invention all that comes within the scope of these claims.

Claims

1. An access control method, comprising:

contactlessly detecting a first data carrier (130) using a data-carrier reader (120);
contactlessly detecting a second data carrier (132) using the data-carrier reader (120); and
selecting, using a computer-based system control unit (110), one of a plurality of possible commands associated with respective data carrier combinations, the selected command being associated with a combination of the detected first and second data carriers (130, 132).

2. The method of claim 1, further comprising sending the selected command to an elevator control system (170), to an access control system (160), or to a lock (180).

3. The method of any preceding claim, further comprising providing a plurality of data carriers, the plurality of data carriers comprising the first and second data carriers (130, 132).

4. The method of any preceding claim, further comprising selecting the first and second data carriers (130, 132) for inputting the selected command.

5. The method of any preceding claim, the first and second data carriers (130, 132) being detected using an anti-collision technique.

6. The method of any preceding claim, the detecting of the first data carrier (130) and the detecting of the second data carrier (132) being performed simultaneously or approximately simultaneously.

7. The method of any of claims 1-5, the detecting of the first data carrier (130) and the detecting of the second data carrier (132) appearing to be performed simultaneously.

8. A system (100), comprising:

a data-carrier reader (120); and
a computer-based control unit (110) coupled to the data-carrier reader (120), the computer-based control unit (110) being programmed to perform an access control method, the method comprising,
contactlessly detecting a first data carrier (130) using the data-carrier reader (120),
contactlessly detecting a second data carrier (132) using the data-carrier reader (120), and
selecting one of a plurality of possible commands associated with respective data carrier combinations, the selected command being associated with a combination of the detected first and second data carriers (130, 132).

9. The system of claim 8, the first data carrier (130) being embedded in a first card and the second data carrier (132) being embedded in a second card.

10. The system of claim 8 or 9, the first data carrier comprising a radio-frequency identification tag (140).

11. The system of claim 8 or 9, the first data carrier comprising an optical code (140).

12. The system of any of claims 8-11, further comprising an elevator control system (170) coupled to the computer-based control unit (110), a lock (180) coupled to the computer-based control unit (110), and/or an access control system (160) coupled to the computer-based control unit (110).

13. The system of any of claims 8-12, the data-carrier reader (120) having a range of approximately 1 meter or less than 1 meter.

14. The system of any of claims 8-13, further comprising a plurality of data-carrier cards, the plurality of data-carrier cards comprising the first and second data carriers (130, 132).

15. One or more computer-readable storage media (520) having encoded thereon instructions that, when executed by a processor (510), cause the processor (510) to perform an access control method, the method comprising:

contactlessly detecting a first data carrier (130) using a data-carrier reader (120);
contactlessly detecting a second data carrier

(132) using the data-carrier reader (120); and selecting one of a plurality of possible commands associated with respective data carrier combinations, the selected command being associated with a combination of the detected first and second data carriers (130, 132).

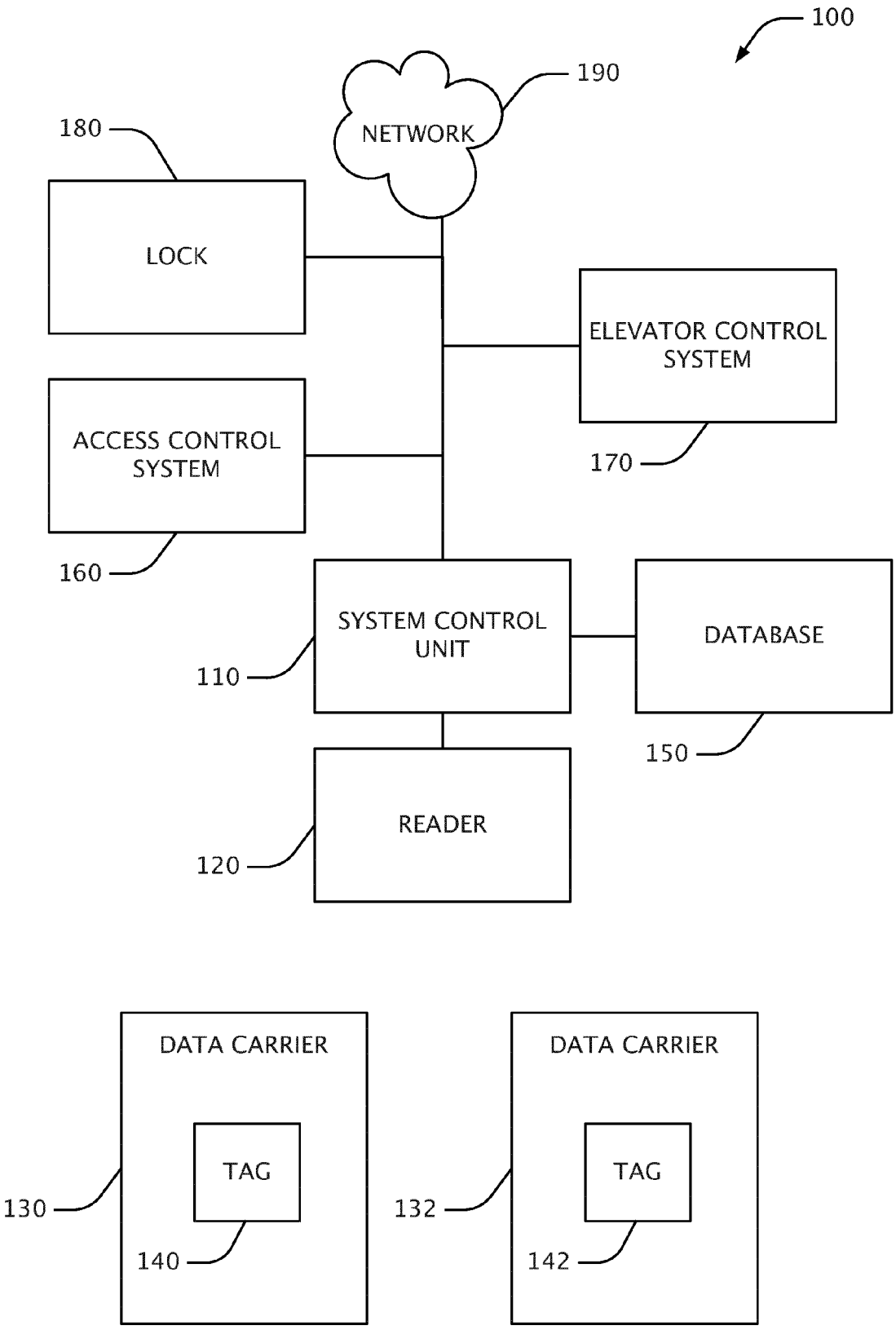
100
190
NETWORK
180
LOCK
ELEVATOR CONTROL SYSTEM
170
ACCESS CONTROL SYSTEM
160
SYSTEM CONTROL UNIT
110
DATABASE
150
READER
120
DATA CARRIER
TAG
130
140
DATA CARRIER
TAG
132
142

FIG. 1

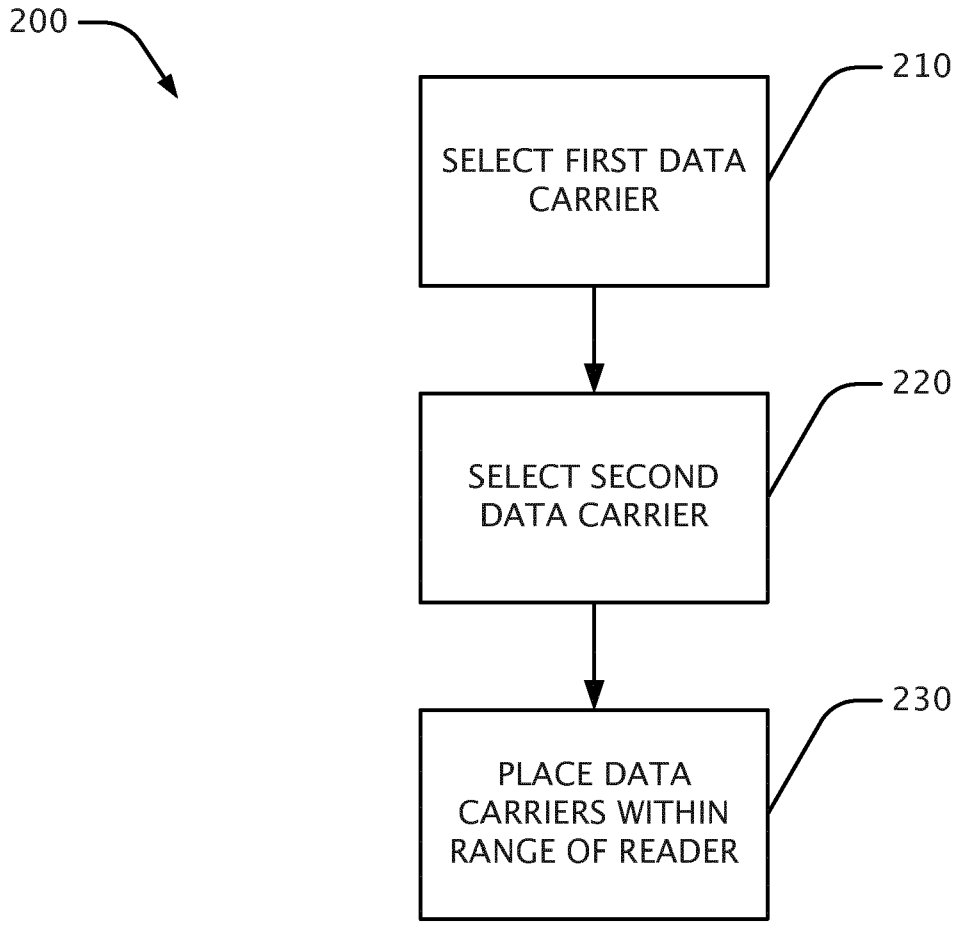
200
210
SELECT FIRST DATA CARRIER
220
SELECT SECOND DATA CARRIER
230
PLACE DATA CARRIERS WITHIN RANGE OF READER

FIG. 2

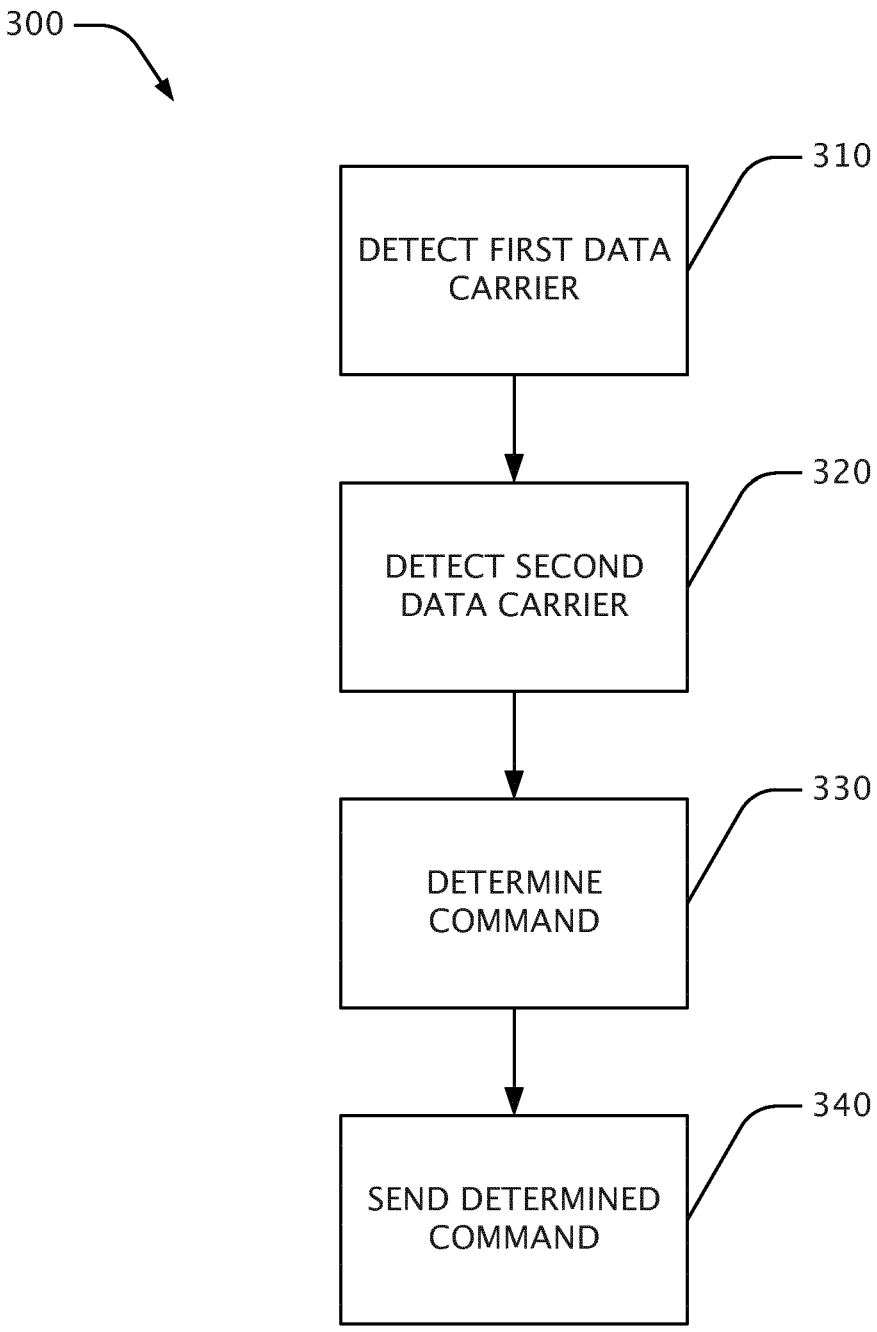
300
310
DETECT FIRST DATA CARRIER
320
DETECT SECOND DATA CARRIER
330
DETERMINE COMMAND
340
SEND DETERMINED COMMAND

FIG. 3

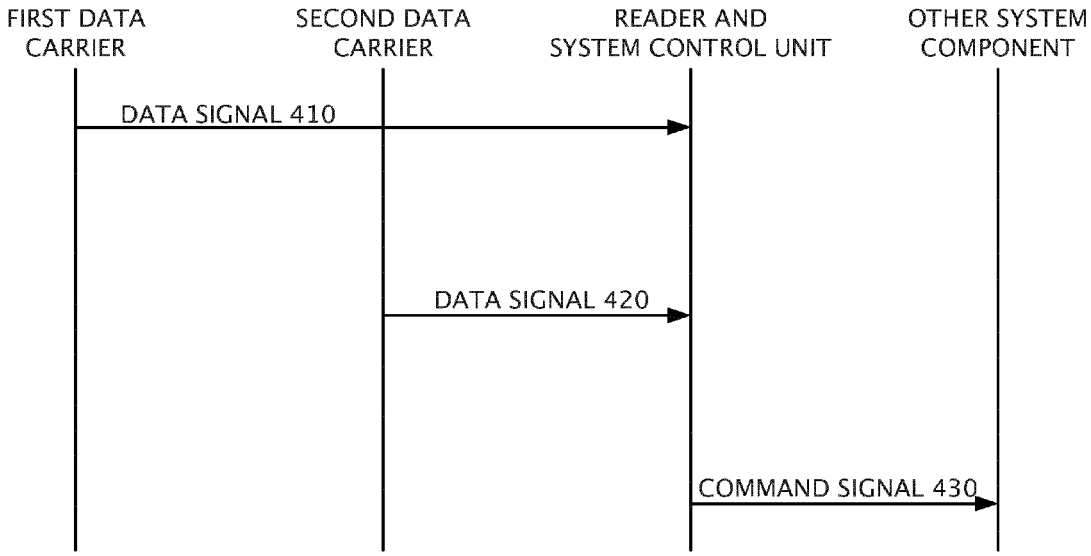
FIRST DATA CARRIER
SECOND DATA CARRIER
READER AND SYSTEM CONTROL UNIT
OTHER SYSTEM COMPONENT
DATA SIGNAL 410
DATA SIGNAL 420
COMMAND SIGNAL 430

FIG. 4

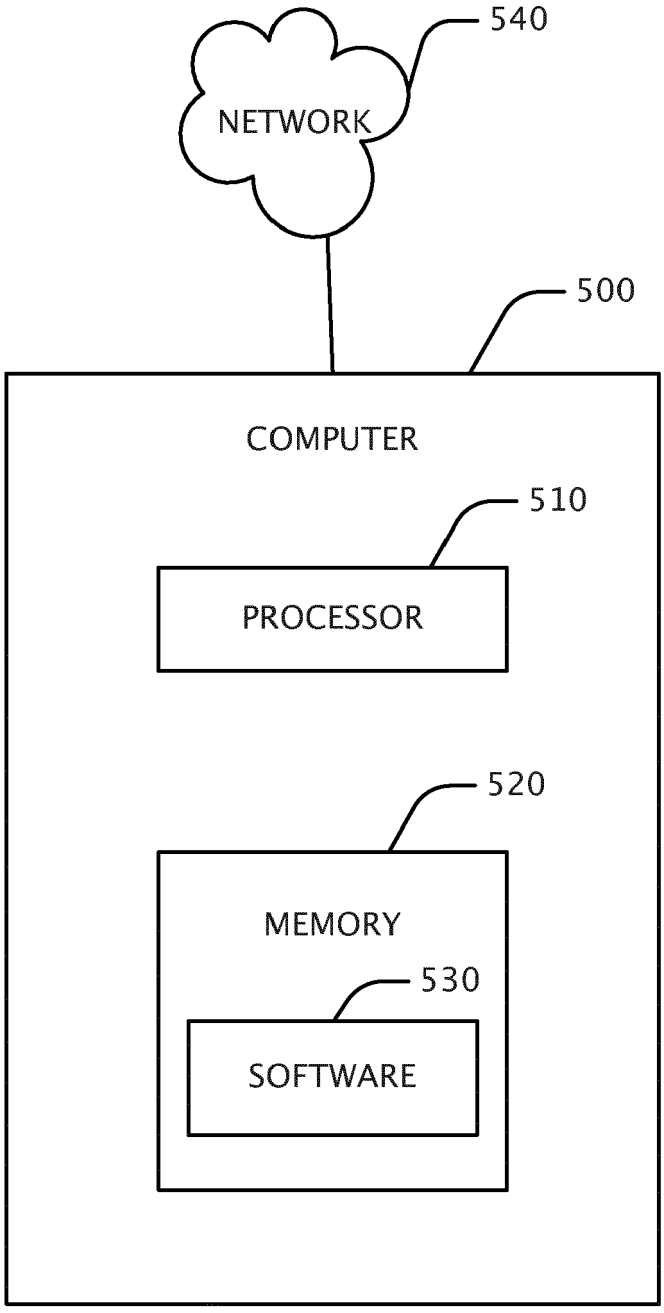
540
NETWORK
500
COMPUTER
510
PROCESSOR
520
MEMORY
530
SOFTWARE

FIG. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 18 2614

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 2006/017881 A2 (INLINK TECHNOLOGIES PTY LTD [AU]; ROYDHOUSE OLIVER [AU]) 23 February 2006 (2006-02-23) * abstract * * * figure 1 * * page 1, line 15 - page 7, line 11 * * page 11, line 14 - page 17, line 3 * -----	1-15	INV. G07C9/00
X	WO 98/52136 A1 (AMERICAN CARD TECHNOLOGY INC [US]; FINDLEY RAYMOND JR [US]; DIXON ROBE) 19 November 1998 (1998-11-19) * abstract * * * page 1, line 27 - page 10, line 5 * * page 12, line 34 - page 22, line 8 * -----	1-15	
X	US 2004/263316 A1 (DIX PETER J [US] ET AL) 30 December 2004 (2004-12-30) * abstract * * * figures 1-5 * * paragraph [0007] - paragraph [0016] * -----	1,3-11, 13-15	
A	US 4 979 594 A (BEGLE GUNTRAM [CH] ET AL) 25 December 1990 (1990-12-25) * abstract * * * figure 1 * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC) G07C G06F G09B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 March 2013	Pañeda Fernández, J

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 18 2614

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.

14-03-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006017881 A2	23-02-2006	NONE	
WO 9852136 A1	19-11-1998	AU 726476 B2	09-11-2000
		AU 7366598 A	08-12-1998
		CA 2287833 A1	19-11-1998
		EP 0995165 A1	26-04-2000
		US 5979773 A	09-11-1999
		WO 9852136 A1	19-11-1998
US 2004263316 A1	30-12-2004	NONE	
US 4979594 A	25-12-1990	CA 1321271 C	10-08-1993
		DE 58901222 D1	27-05-1992
		EP 0341381 A1	15-11-1989
		ES 2031646 T3	16-12-1992
		JP 2013582 A	17-01-1990
		US 4979594 A	25-12-1990

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20110100762 A1 **[0003]**