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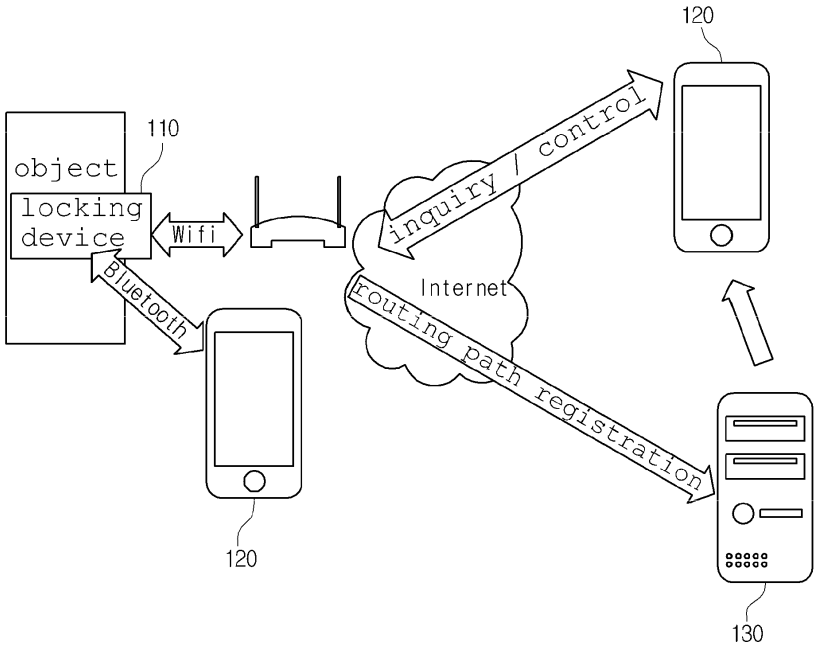
(54) **CONTROL SYSTEM AND METHOD FOR LOCKING DEVICE**

(57) The present invention relates to a system for controlling a locking device installed on an object, the control system including: a electronic locking device 110 installed to lock the object; a user terminal 120 for executing a locking device controlling application 121 installed thereon, transmitting an operation controlling signal of the locking device 110, and controlling the locking device 110; and a matching server 130 for performing relaying for setting a routing connection path between the locking device 110 presenting on local network and external internet. According to the present invention, users can conveniently control the locking device installed on the object by using the locking device controlling application of the user's smartphone.

Fig.1



EP 3 136 352 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a control system and method for a locking device, and more particularly, to a control system and method for a locking device that is capable of controlling the locking device installed on an object through a user terminal.

Background of the Related Art

[0002] Generally, locking devices are installed on individual objects (hereinafter, referred to as 'object') including home furniture or office furniture, such as desk drawers, cabinets, and safes, and locker cabinets (storage cabinets) installed on public places like schools, libraries, waiting rooms, fitness rooms and sauna rooms, so as to provide security for the objects.

[0003] The locking devices are largely classified into mechanic locking devices and digital locking devices, and so as to remove the inconvenience caused by keeping the keys of the locking devices, recently, the digital locking devices have been variously developed.

[0004] On the other hand, wireless communication technologies have been rapidly developed, and accordingly, if the wireless communication technologies are applied to the locking devices, the conveniences in use of the locking devices can be greatly increased.

[0005] According to one example of conventional practice, a method and system for controlling a safe within an electronic appliance connected to internet network is disclosed in Korean Patent No. 10-2006-0004139, and the method includes the steps of: transmitting safe door locking state releasing information to the electronic appliance through a terminal connectable to the internet network; and determining whether the transmitted safe door locking state releasing information corresponds to previously stored information, and if so, releasing the safe door locking state.

[0006] Another example is disclosed in Korean Patent No. 10-2010-0039095, wherein a furniture-embedded digital locker cabinet has a remote transmission function of transmitting open information thereon to a safe owner's smartphone previously registered thereon when the digital locker cabinet is open, and the digital locker cabinet includes a modem installed on a digital locker cabinet body in which a locking driver is disposed to transmit a theft signal to a management room or a police station through home network and a camera for photographing a user's image to rapidly transmit the user's image data to a remote place if the locking state of the digital locker cabinet is forcedly released, thus arresting the theft.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is an object of the present invention to provide a control system and method for a locking device that is capable of controlling the locking device installed on an object through a user's mobile terminal, at which an application is installed, in a more convenient manner.

[0008] To accomplish the above-mentioned object, according to a first aspect of the present invention, there is provided a control system for a locking device installed on an object, the control system including: the electronic locking device installed to lock the object; and a user terminal for executing a locking device controlling application installed thereon, transmitting an operation controlling signal of the locking device, and controlling the locking device.

[0009] According to the present invention, desirably, the locking device and the user terminal have respective near field communication modules.

[0010] According to the present invention, desirably, the near field communication modules include any one or more of Bluetooth, Wi-Fi, and an infrared communication module.

[0011] According to the present invention, desirably, the locking device includes: a control unit for generating a locking state releasing signal during the operation controlling signal is received from the user terminal; a driving unit for generating a driving force by the locking state releasing signal generated from the control unit; and a locking unit operated with the driving force generated from the driving unit to release the locking state.

[0012] According to the present invention, desirably, the control system further includes a matching server for performing relaying for setting a routing connection path between the locking device presenting on local network and external internet.

[0013] According to the present invention, desirably, the locking device further includes a shock sensor and an acceleration sensor, and during a information of shock or movement of the locking device is received from the locking device, the matching server transmits a warning message to the user terminal.

[0014] According to the present invention, desirably, the locking device stores the locking device controlling application therein, and the user terminal is connected to the locking device to download the locking device controlling application.

[0015] According to the present invention, desirably, the user terminal downloads and installs the locking device controlling application from App markets.

[0016] According to the present invention, desirably, during the locking device is installed on a plurality of objects, respectively, the control system further includes a management server for monitoring the states of plurality of the locking devices, controlling the locking devices re-

motely, and providing functions to give and withdraw authority of object locking state releasing to individual users of the locking devices.

[0017] To accomplish the above-mentioned object, according to a second aspect of the present invention, there is provided a method for controlling a locking device installed on an object, the control method for locking device including the steps of: installing a locking device controlling application on a user terminal; registering the locking device installed on the object by using the locking device controlling application installed on the user terminal; transmitting an operation controlling signal of the locking device by executing the locking device controlling application installed on the user terminal; and releasing the locking state of the object by the operation controlling signal.

[0018] According to the present invention, desirably, a first user terminal which have registered the locking device transmits an authentication number to a second user terminal, and the second user terminal registers the locking device with the received authentication number.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

FIG.1 is a concept view showing a control system for a locking device according to the present invention;

FIG.2 is a block diagram showing a configuration of the locking device of the control system according to the present invention;

FIG.3 is a perspective view showing the use example of the locking device of the control system according to the present invention;

FIG.4 is a block diagram showing a configuration of the user terminal of the control system according to the present invention;

FIG.5 is a diagram showing the use example of the control system for a locking device according to the present invention;

FIG.6 is a flowchart showing a control method for a locking device according to the present invention;

FIG.7 is a diagram showing an object registration process scenario of the control method according to the present invention; and

FIG.8 is a diagram showing an authorization scenario of the control method according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Hereinafter, an explanation on a control system and method for a locking device according to the present invention will be in detail given with reference to the attached drawing. In the description of the present invention, if it is determined that the detailed explanation on the well known technology related to the present invention makes the scope of the present invention not clear, the explanation will be avoided.

[0021] FIG.1 is a concept view showing a control system for a locking device according to the present invention, FIG.2 is a block diagram showing a configuration of the locking device of the control system according to the present invention, FIG.3 is a perspective view showing the use example of the locking device of the control system according to the present invention, FIG.4 is a block diagram showing a configuration of the user terminal of the control system according to the present invention, FIG.5 is a diagram showing the use example of the control system for a locking device according to the present invention, FIG.6 is a flowchart showing a control method for a locking device according to the present invention, FIG.7 is a diagram showing an object registration process scenario of the control method according to the present invention, and FIG.8 is a diagram showing an authorization scenario of the control method according to the present invention.

[0022] A technical subject of a control system and method for a locking device according to the present invention is to conveniently control the locking device installed on an object through a user's mobile terminal.

[0023] As shown, the control system for a locking device according to the present invention largely includes the electronic locking device 110, a user terminal 120, and a matching server 130.

[0024] The electronic locking device 110 is installed to lock a given object. That is, the electronic locking device 110 is installed on an appropriate position of an object, such as furniture including drawers, cabinets, and safes, and locker cabinets (storage cabinets) installed on public places like schools, libraries, waiting rooms, fitness rooms and sauna rooms.

[0025] The electronic locking device 110 has a near field communication module 111 like Bluetooth, Wi-Fi, and infrared communication module so as to communicate with the user terminal 120.

[0026] And, the locking device 110 includes a control unit 112, a driving unit 113 and a locking unit 114.

[0027] The control unit 112 generates a locking state releasing signal if an operation controlling signal is received from the user terminal 120 at which a locking device controlling application 121 as will be discussed later is installed. That is, if the operation controlling signal is received from the use terminal 120, the received operation controlling signal is analyzed by Firmware Software embedded in the control unit 112 to generate the locking state releasing signal.

[0028] The driving unit 113 is composed of a motor, etc. and generates a given driving force by means of the locking state releasing signal generated from the control

unit 112. The motor may be a BLDC (Brushless DC) motor. The BLDC motor has relatively higher efficiency, higher speed, longer life span, lower noise, and easier speed control than general DC motors, thus expecting more stable system building and energy saving effects and reducing the maintenance cost because of less failure like burning damages of motor, etc.

[0029] The locking unit 114 operates with the driving force generated from the driving unit 113 to release the locking state of the object. For example, as shown in FIG. 3, the locking unit 114 has a kind of a plate insertable into a slot formed on the object, and it is rotatably installed in such a manner as to release the locking state of the object according to the rotating degree of the driving unit 113.

[0030] Additionally, the locking device 110 further may include a shock sensor and an acceleration sensor.

[0031] If the shock or movement information of the locking device 110 is received from the locking device 110, the matching server 130 determines that the locking device 110 is in an abnormal state and may transmit a warning message to the user terminal 120.

[0032] On the other hand, the locking device 110 stores the locking device controlling application 121 in a separate memory, and if there is a download request of the locking device controlling application 121 from the user terminal 120, the locking device controlling application 121 can be provided to the user terminal 120.

[0033] The user terminal 120 can be connected to the locking device 110 to download and install the locking device controlling application 121.

[0034] Of course, the user terminal 120 can download the locking device controlling application 121 from App markets, such as android market, T store, App store of Apple and the like.

[0035] Further, the locking device 110 has an embedded battery from which power is supplied or is always connected to external power.

[0036] The user terminal 120 includes all kinds of handheld mobile terminals like smartphone terminal, and the locking device controlling application 121 is installed on the user terminal 120. Accordingly, the user terminal 120 executes the locking device controlling application 121 and thus transmits an operation controlling signal of the locking device 110, thus controlling the locking device 110.

[0037] At this time, the user terminal 120 has a near field communication module 122 like Bluetooth, Wi-Fi, and infrared communication module so as to communicate with the locking device 110. Accordingly, the locking device 110 and the user terminal 120 transmit and receive signals to and from each other in any communication way of Bluetooth, Wi-Fi, and infrared communication module according to their use environment.

[0038] The matching server 130 performs relaying for setting a routing connection path between the locking device 110 presenting on local network and external internet. Accordingly, the matching server 130 provides a TCP path communicatable with the locking device 110 by using a locking device identification number stored in the user terminal 120.

[0039] According to the control system for the locking device, as shown in FIG.5, if the locking devices 110 are installed on a plurality of objects like personal drawers or public cabinets, the control system for the locking device according to the present invention further includes a management server 140 for monitoring the states of the locking devices 110, controlling the locking devices 110 remotely, and providing functions to give and withdraw authority of object locking releasing to individual users of the locking devices.

[0040] On the other hand, an explanation on a control method for a locking device according to the present invention will be given with reference to FIG.6.

[0041] First, a locking device controlling application is installed on a user terminal (at step S110).

[0042] Next, the electronic locking device installed on an object to be controlled is registered by using the locking device controlling application installed on the user terminal (at step S120).

[0043] At this time, as shown in FIG.7, if a registration button provided on the locking device of the object is pressed, the locking device is changed into a registerable state (①), and after the registerable locking state is searched by using the application installed in the user terminal 120, the locking device is registered (②). Further, it is possible to perform Wi-Fi AP setting and registration around the locking device (③).

[0044] Further, as shown in FIG.8, if a first user terminal 120A which have registered the locking device transmits an authentication number to a second user terminal 120B so as to provide authorization to the second user terminal 120B (①, ②). the second user terminal 120B registers the locking device with the received authentication number (③). At this time, the user to which the authorization is provided, that is, the user of the second user terminal 120B cannot authorization.

[0045] On the other hand, the locking device controlling application installed on the user terminal is executed to transmit the operation controlling signal of the locking device to the locking device (at step S130).

[0046] Lastly, the locking device releases the locking state of the object by means of the operation controlling signal (at step S140).

[0047] As described above, according to the present invention, users can conveniently control the locking device installed on the object like a drawer, cabinet, and safe through the locking device controlling application installed on the user's smartphone. Accordingly, security through the smartphone can be extendedly applied to office environments as well as general homes. Further, the security is provided reliably at a lower cost than the conventional practice.

[0048] Additionally, the locking device can be conveniently controlled even at close range through wireless communication, such as Bluetooth, Wi-Fi and so on, with-

out having internet connection environments. Further, the developing cost for additional functions requested by general customers using the locking device can be reduced. Furthermore, the plurality of locking devices can be controlled remotely, thus allowing an integrated cabinet security management system to be built in an office space of a company.

[0049] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

[0050] Accordingly, the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that the scope of the present invention is not limited to the specific embodiments but various changes in form and details may be made therein without departing from the scope of the present invention as defined by the following claims.

Claims

1. A system for controlling a locking device installed on an object, the control system for locking device comprising:

   a electronic locking device (110) installed to lock the object; and
   a user terminal (120) for executing a locking device controlling application (121) installed thereon, transmitting an operation controlling signal of the locking device (110), and controlling the locking device (110).

2. The control system for locking device according to claim 1, wherein the locking device 110 and the user terminal (120) have respective near field communication modules (111, 122).

3. The control system for locking device according to claim 2, wherein the near field communication modules (111, 122) comprise any one or more of Bluetooth, Wi-Fi, and an infrared communication module.

4. The control system for locking device according to claim 1, wherein the locking device (110) comprises:

   a control unit (112) for generating a locking state releasing signal during the operation controlling signal is received from the user terminal (120);
   a driving unit (113) for generating a driving force by the locking state releasing signal generated from the control unit (112); and
   a locking unit (114) operated with the driving force generated from the driving unit (113) to release the locking state.

5. The control system for locking device according to claim 1, further comprising a matching server (130) for performing relaying for setting a routing connection path between the locking device (110) presenting on local network and external internet.

6. The control system for locking device according to claim 5, wherein the locking device (110) comprises a shock sensor and an acceleration sensor, and during a information of shock or movement of the locking device (110) is received from the locking device (110), the matching server (130) transmits a warning message to the user terminal (120).

7. The control system for locking device according to claim 1, wherein the locking device (110) stores the locking device controlling application (121) therein, and the user terminal 120 is connected to the locking device (110) to download and install the locking device controlling application (121).

8. The control system for locking device according to claim 1, wherein the user terminal (120) downloads and installs the locking device controlling application (121) from App markets.

9. The control system for locking device according to claim 1, further comprising, during the locking device (110) is installed on a plurality of objects, respectively, a management server (140) for monitoring the states of plurality of the locking devices (110), controlling the locking devices (110) remotely, and providing functions to give and withdraw authority of object locking state releasing to individual users of the locking devices.

10. A method for controlling a locking device installed on an object, the control method for locking device comprising the steps of:

    installing a locking device controlling application on a user terminal;
    registering the locking device installed on the object by using the locking device controlling application installed on the user terminal;
    transmitting an operation controlling signal of the locking device by executing the locking device controlling application installed on the user terminal; and
    releasing the locking state of the object by the operation controlling signal.

11. The control method for locking device according to claim 10, wherein a first user terminal which have registered the locking device transmits an authenti-

cation number to a second user terminal, and the second user terminal registers the locking device with the received authentication number.

Fig.1

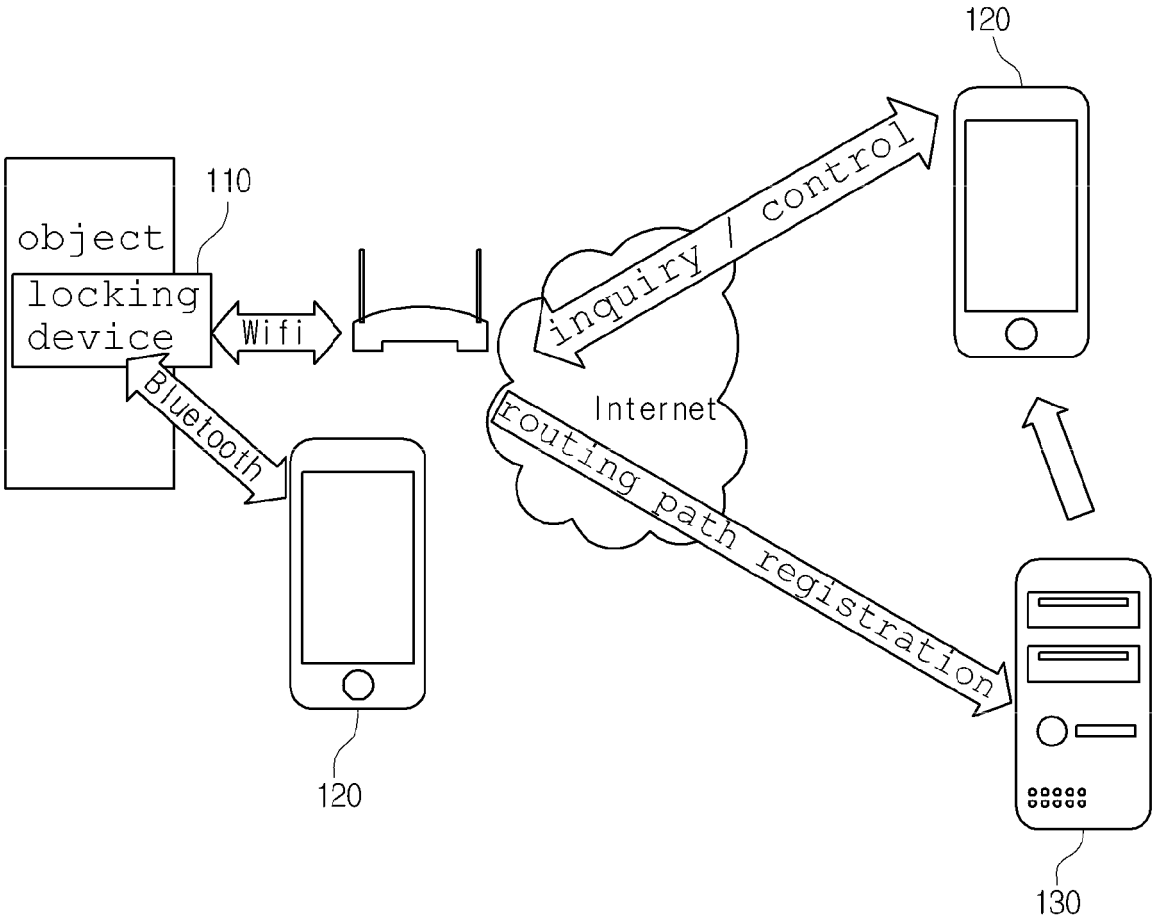

120
110
object
locking device
Wifi
inquiry / control
Internet
Bluetooth
routing path registration
120
130

Fig.2

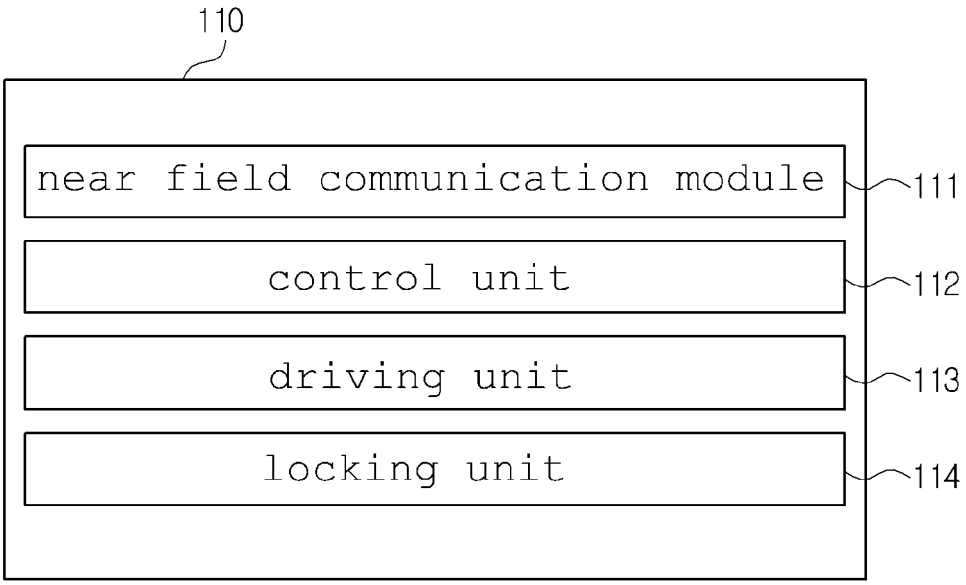

110
near field communication module
111
control unit
112
driving unit
113
locking unit
114

Fig.3

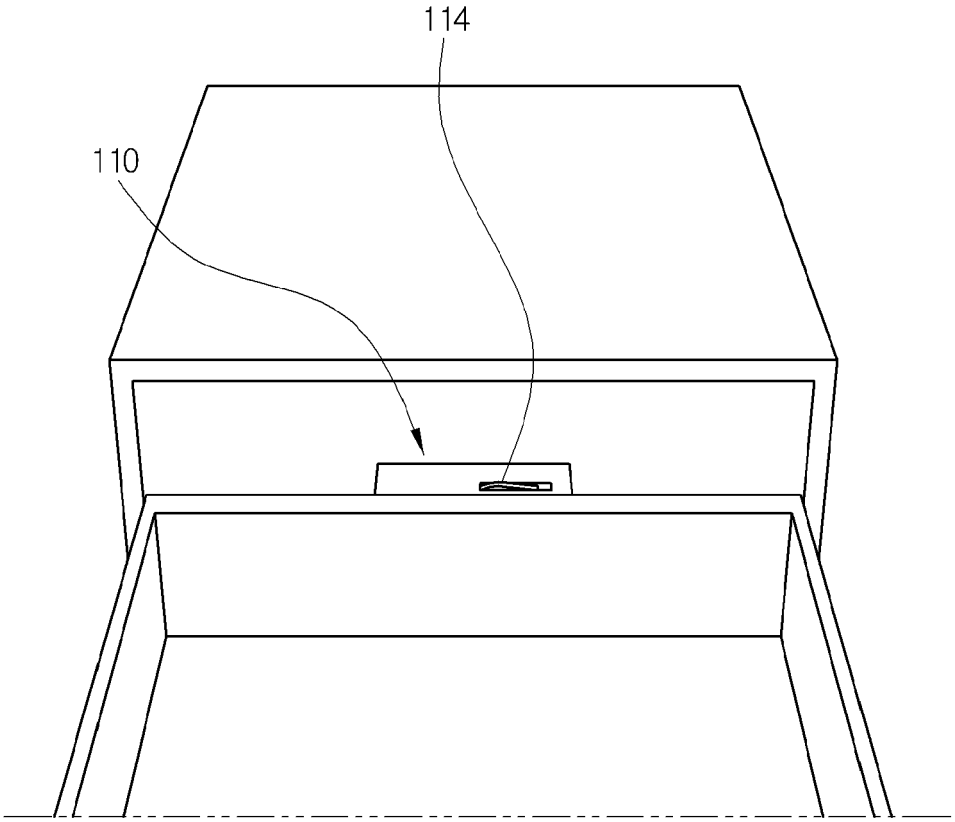


Fig.4

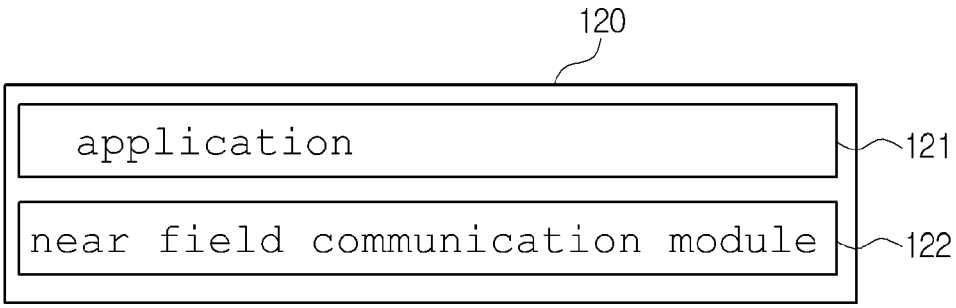


Fig.5

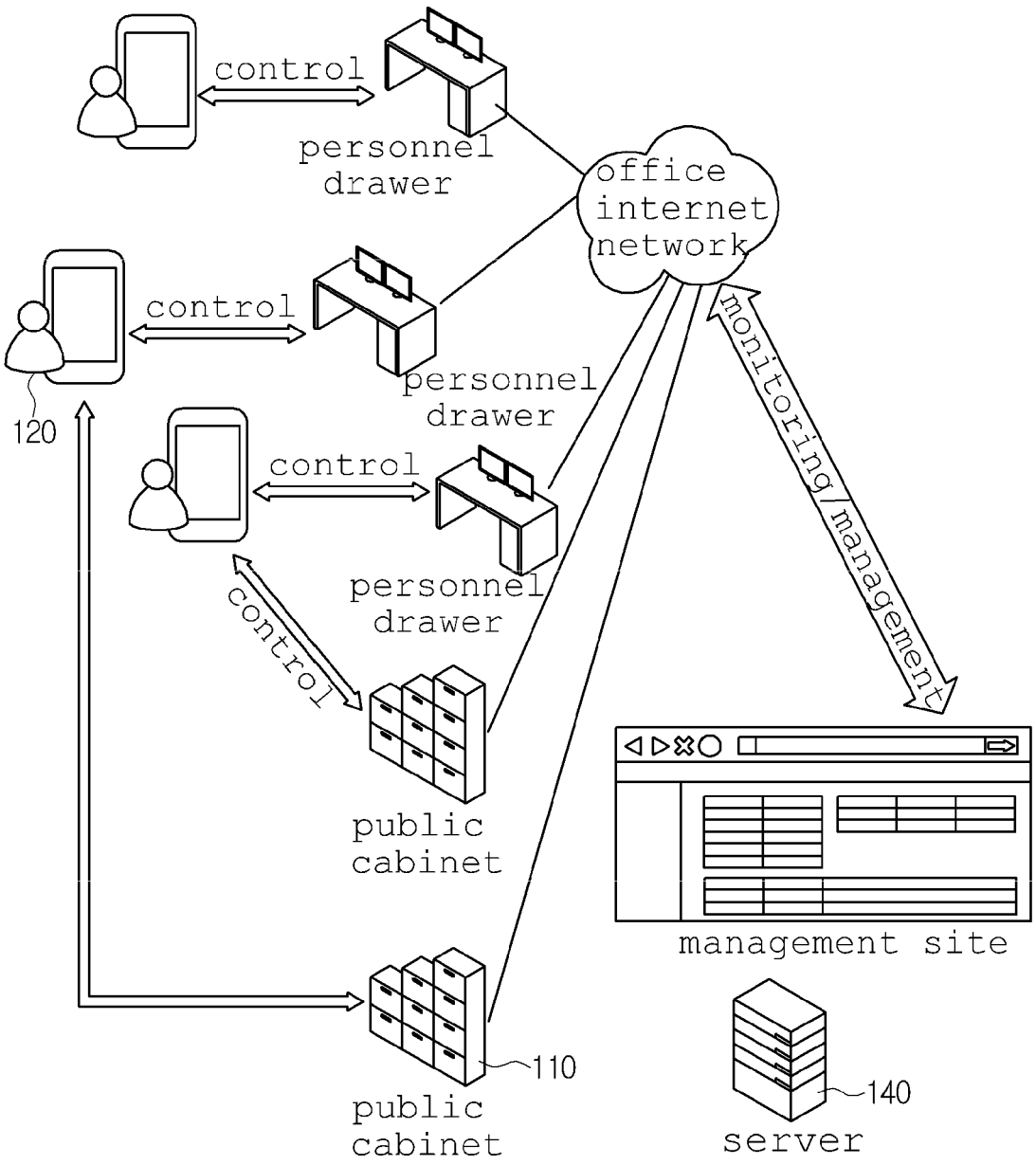

control
personnel drawer
office internet network
control
personnel drawer
monitoring/management
120
control
personnel drawer
control
public cabinet
management site
110
public cabinet
140
server

FIG.6

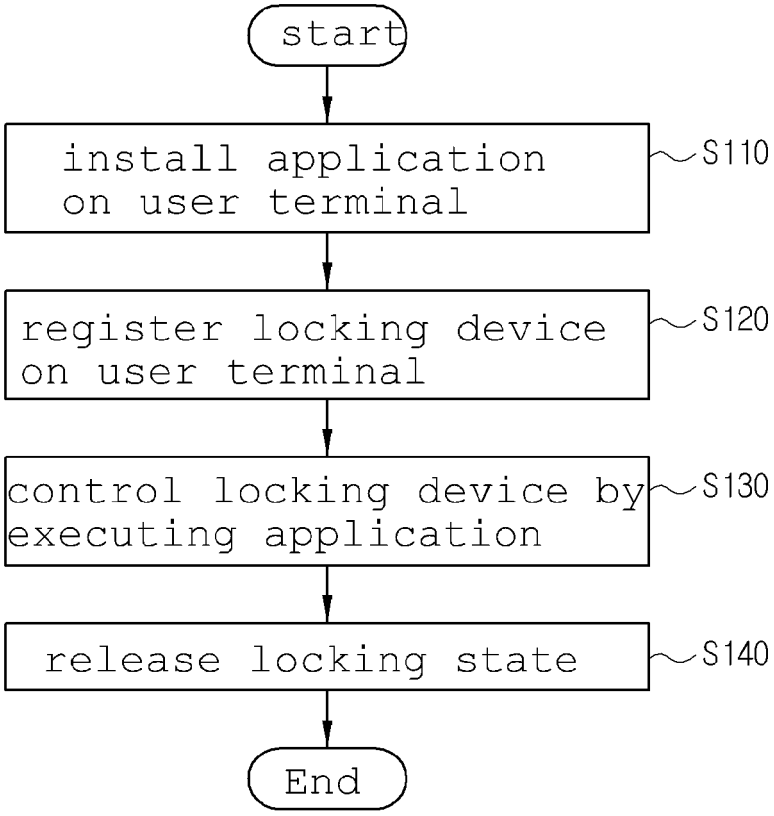

start
install application on user terminal
S110
register locking device on user terminal
S120
control locking device by executing application
S130
release locking state
S140
End

Fig.7

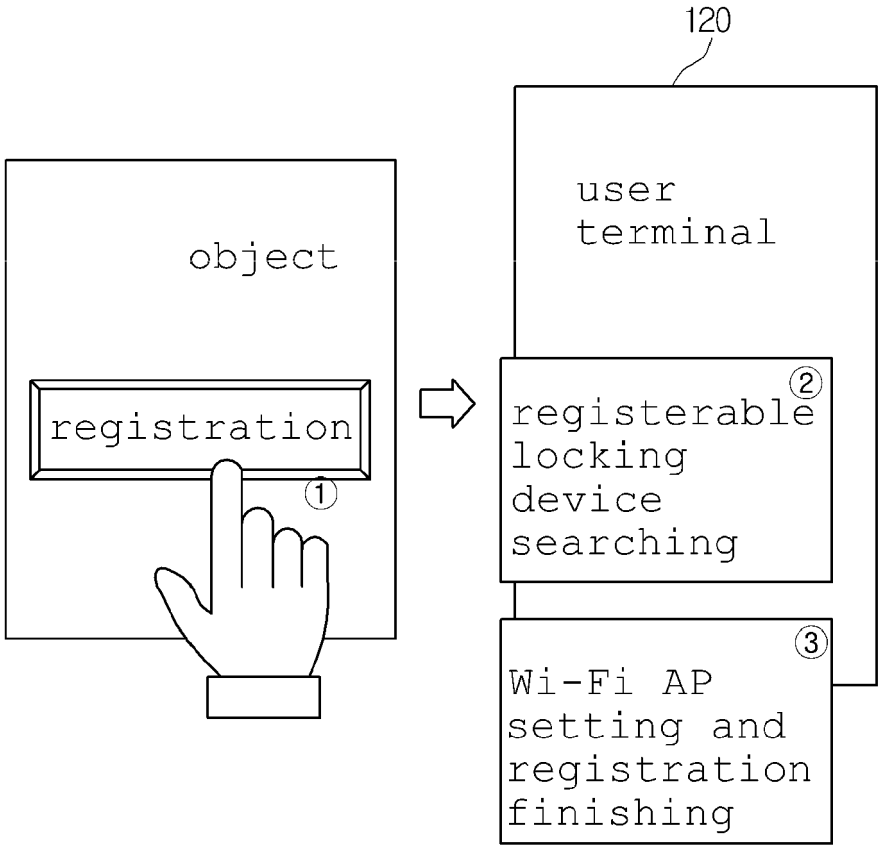
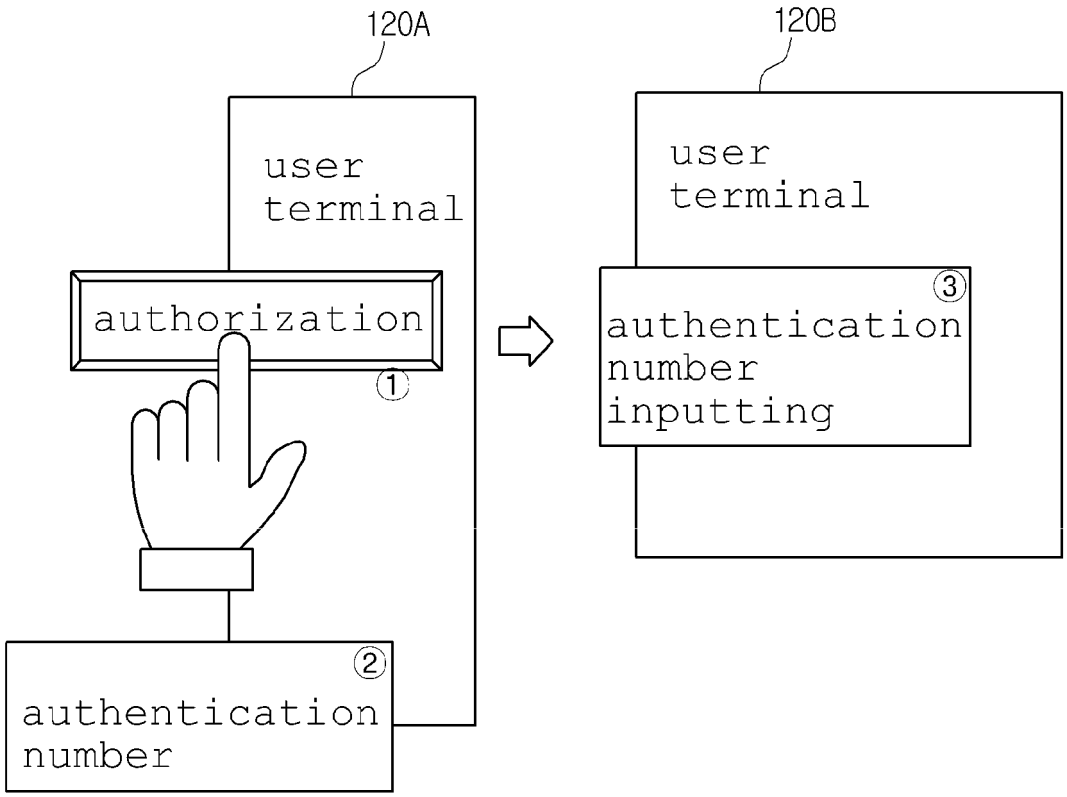

120
user terminal
object
registration
①
②
registerable locking device searching
③
Wi-Fi AP setting and registration finishing

Fig.8


120A
user terminal
authorization
①
②
authentication number
120B
user terminal
③
authentication number inputting

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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 4641

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 A	US 2012/280783 A1 (GERHARDT PAUL MICHAEL [US] ET AL) 8 November 2012 (2012-11-08) * abstract; figures 1-7, 12, 13, 15, 20, 22-25 * * paragraph [0003] * * paragraph [0007] - paragraph [0009] * * paragraph [0014] - paragraph [0017] * * paragraph [0037] - paragraph [0050] * * paragraph [0059] * * paragraph [0068] - paragraph [0090] * * paragraph [0097] * * paragraph [0103] * * paragraph [0111] - paragraph [0112] * * paragraph [0122] - paragraph [0151] * * paragraph [0156] * * paragraph [0160] - paragraph [0178] * -----	1-6,8-11 7	INV. G07C9/00
X A	US 2014/077929 A1 (DUMAS PHILIP C [US] ET AL) 20 March 2014 (2014-03-20) * abstract; figures 1, 2b, 3b, 4, 5, 7a, 7b, 8, 9, 10 * * paragraph [0007] - paragraph [0019] * * paragraph [0049] - paragraph [0064] * * paragraph [0069] - paragraph [0070] * * paragraph [0087] - paragraph [0088] * * paragraph [0097] - paragraph [0104] * * paragraph [0114] * * paragraph [0123] - paragraph [0126] * * paragraph [0136] - paragraph [0137] * * paragraph [0145] * * paragraph [0156] * -----	1-6,9-11 7,8	TECHNICAL FIELDS SEARCHED (IPC) G07C

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 January 2017	Holzmann, Wolf

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 4641

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 A	KR 2014 0115631 A (SAMSUNG ELECTRO MECH [KR]) 1 October 2014 (2014-10-01) * abstract; figure 1 * * paragraph [0001] * * paragraph [0010] - paragraph [0016] * * paragraph [0019] * * paragraph [0022] - paragraph [0027] * * paragraph [0038] - paragraph [0042] * * paragraph [0048] * * paragraph [0052] * * paragraph [0064] * * paragraph [0080] - paragraph [0082] * -----	1-3,7,8,10 4-6,9,11	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 January 2017	Holzmann, Wolf

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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 19 4641

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18-01-2017

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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

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- KR 1020060004139 **[0005]**
- KR 1020100039095 **[0006]**