

**INTERPHONE SYSTEM FOR HOUSING COMPLEX AND INTERPHONE SYSTEM  
FOR HOUSING**

[TECHNICAL FIELD]

**[0001]**        The present disclosure relates to data processing  
5 technologies and, more particularly, to an interphone system  
for a housing complex and an interphone system for a housing.

[BACKGROUND ART]

**[0002]**        A technology is proposed to improve usability  
both for residents and visitors of a housing complex while  
10 securing security at the same time, by using a general-  
purpose recording medium possessed by a visitor to the  
housing complex and making it possible to unlock an electric  
lock by authenticating the recording medium a predetermined  
number of times or for a predetermined period of time (see,  
15 for example, patent literature 1).

**[0003]**

[Patent Literature 1] JP2009-24427

[SUMMARY OF INVENTION]

[TECHNICAL PROBLEM]

20 **[0004]**        Smart keys for locking or unlocking a door  
electronically without using a mechanical key have become  
popular. We have thought that it is necessary to switch the  
security level depending on whether a person attempting to  
enter a housing is a resident of the housing or otherwise, in  
25 order to meet both security and convenience requirements in  
entrance to a housing using a smart key.

**[0005]**       The present disclosure addresses the issue described above, and a purpose thereof is to provide a technology capable of meeting both security and convenience requirements in entrance to a housing using a smart key.

5   [SOLUTION TO PROBLEM]

**[0006]**       The interphone system for a housing complex according to an aspect of the present disclosure includes: a shared interphone and a first reader provided in a shared entrance of a housing complex; an intra-housing interphone  
10   provided in each housing of the housing complex; and a first controller that controls at least the shared interphone and the intra-housing interphone, wherein the shared interphone captures an image of a person located in the shared entrance, when an authentication operation by the person using a smart  
15   key is input, the first reader transmits authentication information related to the person to the first controller, and the first controller (1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information, (2) when the person is determined  
20   to be a resident of the housing complex, transmits a signal for unlocking a door of the shared entrance, and (3) when the person is determined to be a visitor, causes the shared interphone to output a content that prompts the visitor to input a room number, and, when the room number is input in  
25   the shared interphone, transmits a signal for unlocking the door of the shared entrance and transmits a result of imaging

by the shared interphone to the intra-housing interphone corresponding to the room number input.

**[0007]** Another aspect of the present disclosure also

relates to an interphone system for a housing complex. The

5 interphone system for a housing complex includes: a shared

interphone and a reader provided in a shared entrance of a

housing complex; an intra-housing interphone provided in each

housing of the housing complex; and a controller that

controls at least the shared interphone and the intra-housing

10 interphone, wherein, when an authentication operation by a

person using a smart key is input, the reader transmits

authentication information related to the person to the

controller, and the controller (1) determines whether the

person is a resident of the housing complex or a visitor,

15 based on the authentication information, (2) when the person

is determined to be a visitor, causes the shared interphone

to capture an image of the visitor for a predetermined period

of time and transmits a result of imaging by the shared

interphone to the intra-housing interphone.

20 **[0008]** Still another aspect of the present disclosure

also relates to an interphone system for a housing complex.

The interphone system for a housing complex includes: a

camera and a reader provided in a shared entrance of a

housing complex; an intra-housing interphone provided in each

25 housing of the housing complex; and a controller that

controls at least the camera and the intra-housing

interphone, wherein, when an authentication operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller, and the controller (1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information, (2) when the person is determined to be a visitor, causes the camera to capture an image of the visitor for a predetermined period of time and transmits a result of imaging by the camera to the intra-housing interphone.

**[0009]** Yet another aspect of the present disclosure relates to an interphone system for a housing. The interphone system for a housing includes: an entrance interphone and a reader provided in an entrance of a housing; an intra-housing interphone provided in the housing; and a controller that controls at least the entrance interphone and the intra-housing interphone, wherein, when an authentication operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller, the controller (1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information, (2) when the person is determined to be a resident of the housing, transmits a signal for unlocking a door of the entrance, and (3) when the person is determined to be a visitor, causes the entrance interphone to start capturing an image of the visitor,

transmits a signal for unlocking the door of the entrance,  
and transmits a result of imaging the visitor by the entrance  
interphone to the intra-housing interphone.

**[0010]** Optional combinations of the aforementioned

5 constituting elements, and implementations of the embodiment  
in the form of apparatuses, methods, computer programs, and  
recording mediums recording computer programs may also be  
practiced as additional modes of the present invention.

[ADVANTAGEOUS EFFECTS OF INVENTION]

10 **[0011]** According to the technology of the present  
disclosure, it is possible to meet both security and  
convenience requirements in entrance to a housing using a  
smart key.

[BRIEF DESCRIPTION OF DRAWINGS]

15 **[0012]** Fig. 1 shows a configuration of an interphone  
system for a housing complex according to the exemplary  
embodiment;

Fig. 2 is a flowchart showing the operation of the  
interphone system for a housing complex;

20 Fig. 3 is a flowchart showing the operation of the  
interphone system for a housing complex;

Fig. 4 is a flowchart showing the operation of the  
interphone system for a housing complex;

25 Fig. 5 is a flowchart showing the operation of the  
interphone system for a housing complex according to a  
variation; and

Fig. 6 shows a configuration of the interphone system for a housing.

[DESCRIPTION OF EMBODIMENTS]

**[0013]** The device or the entity that executes the method  
5 according to the disclosure is provided with a computer. By  
causing the computer to run a program, the function of the  
device or the entity that executes the method according to  
the disclosure is realized. The computer is comprised of a  
processor that operates in accordance with the program as a  
10 main hardware feature. The disclosure is non-limiting as to  
the type of the processor so long as the function is realized  
by running the program. The processor is comprised of one or  
a plurality of electronic circuits including a semiconductor  
integrated circuit (IC) or a large-scale integration (LSI).  
15 The terms IC and LSI may change depending on the level of  
integration, and the processor may be comprised of a system  
LSI, a Very Large Scale Integration (VLSI), or an Ultra Large  
Scale Integration (ULSI). A field programmable gate array  
(FPGA), which is programmed after an LSI is manufactured, or  
20 a reconfigurable logic device, in which connections inside  
the LSI can be reconfigured or circuit compartments inside  
the LSI can be set up, can be used for the same purpose. The  
plurality of electronic circuits may be integrated in one  
chip or provided in a plurality of chips. The plurality of  
25 chips may be aggregated in one device or provided in a  
plurality of apparatuses. The program may be recorded in a

non-transitory recording medium such as a computer-readable read only memory (ROM), optical disk, and hard disk drive or recorded in a non-transitory storage medium. The program may be stored in a recording medium in advance or supplied to a recording medium via a wide area communication network including the Internet.

**[0014]** In an exemplary embodiment, a technology capable of meeting both security and convenience requirements in entrance to and exit from a housing complex having a shared area and a resident-only area is proposed. The interphone system for a housing complex of the exemplary embodiment switches the security level depending on whether a person attempting to enter a shared area or a resident-only area of a housing complex or a person attempting to leave a resident-only area of the housing complex is a resident of the housing complex or a person other than a resident (hereinafter, also referred to as "visitor"). The visitor encompasses providers of various services (servicers) as well as relatives and friends of the residents. The servicer encompasses, for example, postal service persons, door-to-door service persons, home service persons, and home care workers.

**[0015]** Fig. 1 shows a configuration of an interphone system 20 for a housing complex according to the exemplary embodiment. A housing complex 10 in which the interphone system 20 for a housing complex is built is a condominium provided with a resident-only area 12, a shared area 14, and

a shared entrance 16. The resident-only area 12 is a housing as a resident-only space for a resident living in the housing complex 10. The housing complex 10 is provided with a plurality of resident-only areas 12 (housing). The shared  
5 area 14 is a space shared by multiple residents living in the housing complex 10 and includes, for example, a lobby, a passageway, an elevator, etc. The shared entrance 16 is also referred to as a communal entrance. When the shared entrance 16 is shared by multiple residents of the housing complex 10,  
10 the shared entrance 16 is an entrance space of the housing complex 10.

**[0016]** An intra-housing interphone 30 used by the resident of the resident-only area 12 is provided in the resident-only area 12. The intra-housing interphone 30 can  
15 be said to be an intra-housing interphone. The intra-housing interphone 30 is at least provided with a display unit and a speaker. The display unit displays an image of a visitor captured by a shared interphone 24 and an extra-housing interphone 34. The speaker outputs a chime sound to call a  
20 resident of the housing.

**[0017]** A shared entrance door 22, a shared interphone 24, and a shared entrance reader 26 are provided in the shared entrance 16. The shared entrance door 22 is a door device that separates the shared entrance 16 and the shared  
25 area 14. The shared interphone 24 is an interphone shared by multiple residents of the housing complex 10 and visitors.

The shared interphone 24 is at least provided with an input unit used to input a room number, etc. and a camera for capturing an image of a person located in the shared entrance 16.

5   **[0018]**       The shared entrance reader 26 as a first reader communicates with a smart key 42 described later by near field communication to read data (in the exemplary embodiment, authentication information) from the smart key 42. A shared entrance controller 28 as a first controller  
10 communicates with the shared entrance door 22, the shared interphone 24, the shared entrance reader 26, and the intra-housing interphone 30 to control these devices. In the housing complex 10, the intra-housing interphone 30 is provided in each of the multiple resident-only areas 12  
15 ( housings). The shared entrance controller 28 manages the multiple intra-housing interphones 30 corresponding to the multiple resident-only areas 12 ( housings) by mapping each of the intra-housing interphones 30 to the identification number of each housing (in the exemplary embodiment, room number).

20   **[0019]**       A housing entrance door 32, an extra-housing interphone 34, and a housing entrance reader 36 are provided in the entrance of the resident-only area 12 (hereinafter, referred to as "housing entrance). The housing entrance door 32 separates the resident-only area 12 and the shared area  
25 14. Stated otherwise, the housing entrance door 32 is a door device separating the space inside the housing from the space

outside. The extra-housing interphone 34 can be said to be a housing entrance interphone and is an interphone shared by the resident of the resident-only area 12 and the visitor. The extra-housing interphone 34 is at least provided with a camera for capturing an image of a person located in the housing entrance.

**[0020]** The housing entrance reader 36 as a second reader communicates with the smart key 42 described later by near field communication to read data (in the exemplary embodiment, authentication information) from the smart key 42. The housing entrance controller 38 as the second reader communicates with the housing entrance door 32, the extra-housing interphone 34, the housing entrance reader 36, and the intra-housing interphone 30 to control these devices. In the exemplary embodiment, the housing entrance controller 38 is integrated with the intra-housing interphone 30. Stated otherwise, the function of the housing entrance controller 38 is built in the intra-housing interphone 30.

**[0021]** The smart key 42 is a smart key application installed in the smartphone held by a resident of or a visitor to the housing complex 10. In one variation, the smart key 42 may be a device exclusively for use as a smart key. The smart key 42 is at least provided with a communication unit and a storage unit. The communication unit communicates with the shared entrance reader 26 and the housing entrance reader 36 by near field communication.

**[0022]** The storage unit of the smart key 42 stores authentication information assigned to the holder of the smart key 42 in advance. The authentication information may be data unique to each of the holders (e.g., a resident of or  
5 a visitor to the housing complex 10). For example, the authentication information may be a key code. In the exemplary embodiment, the system of authentication information assigned to the resident of the housing complex 10 and the system of authentication information assigned to  
10 the visitor are different. It is therefore possible to identify whether the holder of the smart key 42 is a resident of the housing complex 10 or a visitor, based on the value indicated by the authentication information read from the smart key 42.

15 **[0023]** The storage device 40 is a storage device that stores data referred to or updated by the shared entrance controller 28 and the housing entrance controller 38. The storage device 40 stores legitimate authentication information assigned to the multiple residents of the housing  
20 complex 10 and each legitimate visitor. The authentication information may be stored such that the authentication information is mapped to the identification information on the resident or the visitor that the authentication information is assigned to. In other words, the resident or  
25 the visitor that the authentication information is assigned may be uniquely identifiable based on the authentication

information. Further, the storage device 40 may store permission information indicating permission of entrance to the shared area 14 and permission information indicating permission of entrance to the resident-only area 12, mapping the permission information to the authentication information on the visitor. These items of permission information may be registered or changed by the resident of the housing complex 10.

**[0024]** Further, the storage device 40 stores data for a result of imaging by the shared interphone 24 and the extra-housing interphone 34 (which can be said to be recording data). The imaging data stored in the storage device 40 is provided to an external device such as the terminal of the maintenance personnel of the housing complex 10 and the terminal of a security service company. The position of provision of the storage device 40 is not limited to a particular location. The storage device 40 may be provided in the housing complex 10 or provided at a remote place (a cloud service, a data center, etc.).

**[0025]** A description will be given of the operation of the interphone system 20 for a housing complex having the configuration described above. Fig. 2 is a flowchart showing the operation of the interphone system 20 for a housing complex. The figure shows the operation related to unlocking of the shared entrance door 22 in the shared entrance 16.

The processes in the respective devices described hereinafter

may be implemented in a computer program stored in the devices. The CPU of each device may realize the process in the device by reading the computer program into the main memory and running the computer program.

5   **[0026]**       The shared interphone 24 stands by until a predetermined call operation is input (N in S10). When a predetermined call operation is input in the shared interphone 24 (Y in S10), the shared interphone 24 starts the process of capturing an image of the person located in the  
10   shared entrance 16 (hereinafter, also referred to as "person to be authenticated") (S11). The person to be authenticated may be a resident of the housing complex 10 or may be a visitor. The call operation in the exemplary embodiment is an authentication operation in a ringer button provided in  
15   the shared interphone 24. When a ringer button operation is received, the shared interphone 24 starts the imaging process performed by the built-in camera.

**[0027]**       The shared interphone 24 notifies the shared entrance controller 28 that imaging is started, and the  
20   shared entrance controller 28 controls the shared entrance reader 26 to be ready to receive an authentication operation (S12). The authentication operation in the exemplary embodiment is an operation of a person to be authenticated to bring the smart key 42 (e.g., the smartphone in which the  
25   smart key application is started) to the shared entrance reader 26.

**[0028]** When an authentication operation by the person to be authenticated using the smart key 42 is not input within a predetermined period of time, i.e., when near field communication with the smart key 42 is not started within the  
5 predetermined period of time (N in S13), the shared entrance reader 26 skips the subsequent steps and ends the illustrated flow. When an authentication operation by the person to be authenticated using the smart key 42 is input, i.e., when near field communication with the smart key 42 is started (Y  
10 in S13), the shared entrance reader 26 reads, from the smart key 42, the authentication information stored in the smart key 42 and related to the person to be authenticated (S14).

**[0029]** The shared entrance reader 26 transmits the authentication information read from the smart key 42 to the  
15 shared entrance controller 28. The shared entrance controller 28 checks the legitimate authentication information stored in the storage device 40 against the authentication information received from the shared entrance reader 26 to determine whether the authentication information  
20 received from the shared entrance reader 26 is legitimate. When the authentication information received from the shared entrance reader 26 is legitimate, the shared entrance controller 28 determines whether the person to be authenticated is a resident of the housing complex 10 or a  
25 visitor, based on the value indicated by the authentication information (S15). When the shared entrance controller 28

determines that the person to be authenticated is a visitor based on the authentication information, the shared entrance controller 28 may perform step S19 and the subsequent steps described later on the condition that permission information  
5 indicating permission of entrance to the shared area 14 is mapped to the authentication information in the storage device 40.

**[0030]** When the person to be authenticated is determined to be a resident of the housing complex 10 (Y in S16), the  
10 shared entrance controller 28 makes the shared entrance door 22 openable by transmitting a signal for unlocking the door to the shared entrance door 22 (S17). Further, the shared entrance controller 28 ends the imaging process performed by the shared interphone 24 (S18). When the person to be  
15 registered is a resident, the data for the result of imaging by shared interphone 24 (which can be said to be recording data capturing an image of the resident) may be deleted without being saved. Alternatively, the shared entrance controller 28 may acquire the data for the result of imaging  
20 from the shared interphone 24 and store the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the person to be authenticated (or the identification information on the resident identified by the authentication information).

25 **[0031]** When the person to be authenticated is determined to be a visitor (N in S16), the shared entrance controller 28

controls the shared interphone 24 to cause the display unit to display a content that prompts the visitor to input a room number or cause the speaker to output a sound with the content (S19). The shared interphone 24 receives the room number input by the person to be authenticated (hereinafter, referred to as a visitor) in the input unit and transmits the input room number to the shared entrance controller 28 (S20). When the room number is received from the shared interphone 24, the shared entrance controller 28 makes the shared entrance door 22 openable by transmitting a signal for unlocking the door to the shared entrance door 22 (S21).

**[0032]** Subsequently, the shared entrance controller 28 ends the imaging process performed by the shared interphone 24 (S22). The shared entrance controller 28 acquires the data for the result of imaging from the shared interphone 24 (which can be said to be recording data capturing an image of the visitor) and maps the data for the result of imaging to the room number input by the visitor (S23).

**[0033]** The shared entrance controller 28 transmits the data for the result of imaging to the intra-housing interphone 30 corresponding to the room number input by the visitor (S24). The intra-housing interphone 30 causes the display unit to display the data for the result of imaging. This makes it possible for the resident of the housing who will be visited by the visitor to check the image of the visitor. The data for the result of imaging transmitted to

the intra-housing interphone 30 may include the authentication information on the visitor (or the identification information on the visitor identified by the authentication information). Further, the shared entrance controller 28 stores the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the visitor (or the identification information on the visitor identified by the authentication information) and to the room number input by the visitor.

10   **[0034]**        Fig. 3 is also a flowchart showing the operation of the interphone system 20 for a housing complex. The figure shows the operation related to unlocking of the housing entrance door 32 of a particular housing of the housing complex (hereinafter, referred to as "particular housing"). The housing entrance reader 36 stands by until an unlocking operation performed by the person attempting to enter the particular housing (also referred to as "person to be authenticated") using the smart key 42 is input (N in S30). The unlocking operation using the smart key 42 can also be said to be an authentication operation for unlocking and is, for example, an operation of bringing the smart key 42 set in an unlocking mode close to the housing entrance reader 36.

25   **[0035]**        The housing entrance reader 36 reads, from the smart key 42, the authentication information stored in the smart key 42 and related to the person to be authenticated

(S31), when an unlocking operation performed by the person to be authenticated by using the smart key 42 is input, and, stated otherwise, when near field communication with the smart key 42 in the unlocking mode is started (Y in S30).

5   **[0036]**       The housing entrance reader 36 transmits the authentication information read from the smart key 42 to the housing entrance controller 38. The housing entrance controller 38 checks the legitimate authentication information stored in the storage device 40 against the authentication information received from the housing entrance reader 36 to determine whether the authentication information received from the housing entrance reader 36 is legitimate. When the authentication information received from the housing entrance reader 36 is legitimate, the housing entrance controller 38 determines whether the person to be authenticated is a resident of the housing complex 10 or a visitor, based on the value indicated by the authentication information (S32). When the housing entrance controller 38 determines that the person to be authenticated is a visitor based on the authentication information, the housing entrance controller 38 may perform step S35 and the subsequent steps described later on the condition that permission information indicating permission of entrance to the resident-only area 12 is mapped to the authentication information in the storage device 40.

**[0037]**       When the person to be authenticated is determined

to be a resident of the housing complex 10 (Y in S33), the housing entrance controller 38 makes the housing entrance door 32 openable by transmitting a signal for unlocking the door to the housing entrance door 32 (S34).

5   **[0038]**       When the person to be authenticated is determined to be a visitor (N in S33), the housing entrance controller 38 controls the extra-housing interphone 34 to start the process of capturing an image of the person to be authenticated (hereinafter, referred to as a visitor) (S35).  
10 Along with this, the housing entrance controller 38 controls the intra-housing interphone 30 to cause the intra-housing interphone 30 to perform an intra-housing call process (e.g., outputting a chime sound) (S36). The housing entrance controller 38 stands by for a predetermined period of time  
15 (e.g., several seconds to several tens of seconds) (S37) and then makes the housing entrance door 32 openable by transmitting a signal for unlocking the door to the housing entrance door 32 (S38). By providing a predetermined period of time from intra-housing call to unlocking of the housing  
20 entrance door 32, it is possible to make the resident ready for entrance of the visitor.

**[0039]**       Subsequently, the housing entrance controller 38 ends the imaging process performed by the extra-housing interphone 34 (S39). The housing entrance controller 38  
25 acquires the data for the result of imaging from the extra-housing interphone 34 (which can be said to be recording data

capturing an image of the visitor) and maps the data for the result of imaging to the room number of the particular housing attempted to be entered by the visitor. The housing entrance controller 38 transmits the data for the result of imaging to the intra-housing interphone 30 (S40). The data for the result of imaging transmitted to the intra-housing interphone 30 may include the authentication information on the visitor (or the identification information on the visitor identified by the authentication information). Further, the shared entrance controller 28 stores the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the visitor (or the identification information on the visitor identified by the authentication information) and to the room number of the particular housing.

**[0040]** Fig. 4 is also a flowchart showing the operation of the interphone system 20 for a housing complex. The figure shows the operation related to locking of the housing entrance door 32 of a particular housing of the housing complex 10 (particular housing). The housing entrance reader 36 stands by until a locking operation performed by the person attempting to leave the particular housing (also referred to as "person to be authenticated") using the smart key 42 is input (N in S50). The locking operation using the smart key 42 can also be said to be an authentication operation for locking and is, for example, an operation of

bringing the smart key 42 set in a locking mode close to the housing entrance reader 36.

**[0041]** When a locking operation by the person to be authenticated using the smart key 42 is input, i.e., when  
5 near field communication with the smart key 42 in the locking mode is started (Y in S50), the housing entrance reader 36 reads, from the smart key 42, the authentication information stored in the smart key 42 and related to the person to be authenticated (S51).

10 **[0042]** The housing entrance reader 36 transmits the authentication information read from the smart key 42 to the housing entrance controller 38. The housing entrance controller 38 checks the legitimate authentication information stored in the storage device 40 against the  
15 authentication information received from the housing entrance reader 36 to determine whether the authentication information received from the housing entrance reader 36 is legitimate. When the authentication information received from the housing entrance reader 36 is legitimate, the housing entrance  
20 controller 38 determines whether the person to be authenticated is a resident of the housing complex 10 or a visitor, based on the value indicated by the authentication information (S52). When the housing entrance controller 38 determines that the person to be authenticated is a visitor  
25 based on the authentication information, the housing entrance controller 38 may perform step S55 and the subsequent steps

described later on the condition that permission information indicating permission of entrance to the resident-only area 12 is mapped to the authentication information.

**[0043]** When the person to be authenticated is determined

5 to be a resident of the housing complex 10 (Y in S53), the housing entrance controller 38 locks the housing entrance door 32 by transmitting a signal for locking the door to the housing entrance door 32 (S54).

**[0044]** When the person to be authenticated is determined

10 to be a visitor (N in S53), the housing entrance controller 38 controls the extra-housing interphone 34 to start the process of capturing an image of the person to be authenticated (hereinafter, referred to as a visitor) (S55).

The housing entrance controller 38 stands by for a

15 predetermined period of time (e.g., several seconds to several tens of seconds) (S56) and then locks the housing entrance door 32 by transmitting a signal for locking the door to the housing entrance door 32 (S57). By providing a predetermined period of time until completion of locking of  
20 the housing entrance door 32, it is possible to make the resident ready for exit of the visitor or locking of the housing entrance door 32.

**[0045]** Subsequently, the housing entrance controller 38

ends the imaging process performed by the extra-housing

25 interphone 34 (S58). The housing entrance controller 38

acquires the data for the result of imaging from the extra-

housing interphone 34 (which can be said to be recording data capturing an image of the visitor) and maps the data for the result of imaging to the room number of the particular housing attempted to be locked by the visitor. The housing entrance controller 38 transmits the data for the result of imaging to the intra-housing interphone 30 (S59). The data for the result of imaging transmitted to the intra-housing interphone 30 may include the authentication information on the visitor (or the identification information on the visitor identified by the authentication information). Further, the housing entrance controller 38 stores the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the visitor (or the identification information on the resident identified by the authentication information) and to the room number of the particular housing.

**[0046]** According to the interphone system 20 for a housing complex of the exemplary embodiment, the security related process is switched depending on whether the person attempting to enter the shared area 14 of the housing complex 10, the person attempting to enter a housing of the housing complex 10, or the person attempting to leave a housing of the housing complex 10 is a resident of the housing complex 10 or a visitor other than the residents. This makes it possible to meet both security and convenience requirements in entrance and exit in the housing complex 10 using the

smart key 42. Further, the security of the housing complex 10 is even more enhanced by saving the image data for the visitor by mapping the data to the room number of the room visited and by providing the image data for the visitor to the intra-housing interphone 30, when the shared entrance door 22 is unlocked by using the smart key 42 or when the housing entrance door 32 is locked or unlocked by using the smart key 42.

**[0047]** The present disclosure has been described above based on an exemplary embodiment. The exemplary embodiment intended to be illustrative only and it will be understood by those skilled in the art that various modifications to combinations of constituting elements and processes are possible and that such modifications are also within the scope of the present disclosure.

**[0048]** A description will be given of the first variation. In the exemplary embodiment described above, imaging of the person to be authenticated is started in response to the reception of a ringer button operation in the shared interphone 24 as a call operation. In one variation, the call operation may be an operation to input a registration number communicated to the person to be authenticated (e.g., a resident or a visitor) in advance. In other words, the shared interphone 24 may start capturing an image of the person to be authenticated when the registration number communicated to the person to be authenticated in

advance is input.

**[0049]** A number unique to each type of service (postal service, house service, etc.) may be assigned as the registration number. The shared entrance controller 28 may  
5 transmit the data for the result of imaging by the shared interphone 24, the authentication information read from the smart key 42 of the visitor, and the registration number input in the call operation (or the type of servicer identified by the registration number) to the intra-housing  
10 interphone 30 and cause them to be displayed. Further, the shared entrance controller 28 may store the data for the result of imaging by the shared interphone 24, the authentication information read from the smart key 42 of the visitor, and the registration number input in the call  
15 operation (or the type of servicer identified by the registration number), mapping them to each other.

**[0050]** In another variation, the shared interphone 24 may start the process of capturing an image of the person located in the shared entrance 16 without requiring a user  
20 input of a call operation. For example, the shared interphone 24 may, when the camera detects that a person is located in the shared entrance 16, automatically start capturing an image of that person (person to be authenticated).

25 **[0051]** A description will be given of the second variation. Fig. 5 is a flowchart showing the operation of

the interphone system 20 for a housing complex according to the variation. The figure shows the operation related to imaging of a visitor in the shared entrance 16. The shared entrance reader 26 stands by until an authentication

5 operation performed by the person attempting to enter the shared area 14 from the shared entrance 16 of the housing complex 10 (also referred to as "person to be authenticated") using the smart key 42 is input (N in S60).

**[0052]** When the authentication operation performed by  
10 the person to be authenticated using the smart key 42 is input (Y in S60), the shared entrance reader 26 reads, from the smart key 42, the authentication information stored in the smart key 42 and related to the person to be authenticated (S61). The shared entrance reader 26 transmits  
15 the authentication information read from the smart key 42 to the shared entrance controller 28. The shared entrance controller 28 checks the legitimate authentication information stored in the storage device 40 against the authentication information received from the shared entrance  
20 reader 26 to determine whether the authentication information received from the shared entrance reader 26 is legitimate. When the authentication information received from the shared entrance reader 26 is legitimate, the shared entrance controller 28 determines whether the person to be  
25 authenticated is a resident of the housing complex 10 or a visitor, based on the value indicated by the authentication

information (S62).

**[0053]** When the person to be authenticated is determined to be a visitor (Y in S63), the shared entrance controller 28 controls the shared interphone 24 to start capturing an image of the person to be authenticated (hereinafter, referred to as a visitor) (S64). When a predetermined period of time elapses after the imaging process is started, the shared entrance controller 28 ends the imaging process performed by the shared interphone 24 (S65). In other words, the shared entrance controller 28 causes the process performed by the shared interphone 24 to capture an image of the visitor to continue for a predetermined period of time.

**[0054]** The shared entrance controller 28 acquires the data for the result of imaging from the shared interphone 24 (which can be said to be recording data capturing an image of the visitor) and transmits the data for the result of imaging to the intra-housing interphone 30 (S66). The destination of transmission of the data for the result of imaging may be the intra-housing interphone 30 corresponding to the room number input by the visitor in a step not shown in Fig. 5. Further, the shared entrance controller 28 stores the data for the result of imaging in the storage device 40.

**[0055]** When the person to be authenticated is determined to be a resident of the housing complex (N in S63), the subsequent steps are skipped, and the illustrated flow is terminated. In this variation, the process of capturing an

image the person to be authenticated is performed only when the person to be authenticated is a visitor. According to the configuration of this variation, too, the security related process is switched depending on whether the person attempting to enter the shared area 14 of the housing complex 10 is a resident of the housing complex or a visitor other than the residents, and both security and convenience requirements in entrance to the housing complex 10 using the smart key are met.

10   **[0056]**       A description will be given of the third variation. The shared interphone 24 of the exemplary embodiment described above has a built-in camera and captures an image of the person located in the shared entrance 16 by using the built-in camera. In one variation, the camera for capturing an image of the person located in the shared entrance 16 may be provided in the shared entrance 16 as a device independent from the shared interphone 24. The second variation and the third variation may be combined such that the shared entrance controller 28 controls the camera independent of the shared interphone 24 to capture an image of the visitor for a predetermined period of time when the person to be authenticated is determined to be a visitor. The shared entrance controller 28 may acquire the data for the result of imaging by the camera and transmit the data for the result of imaging to the intra-housing interphone 30.

**[0057]**       A description will be given of the fourth

variation. The technology of the interphone system 20 for a housing complex of the exemplary embodiment described above is also applicable to an independent housing. Fig. 6 shows a configuration of an interphone system 50 for a housing. The interphone system 50 for a housing is derived from applying the technology described in the exemplary embodiment and related to entrance to and exit from the resident-only area 12 of the housing complex 10 to entrance to and exit from a housing 51, which is an independent housing.

10   **[0058]**       The housing 51 is provided with a house 52 and an entrance 54. An intra-housing interphone 62 used by residents of the housing 51 is provided in the house 52. The intra-housing interphone 62 is provided with the same function as the intra-housing interphone 30 of the exemplary embodiment.

15   **[0059]**       An entrance door 56, an extra-housing interphone 58, and a reader 60 are provided in the entrance 54. The entrance door 56 is a door that separates the entrance 54 and the house 52. The extra-housing interphone 58 can be said to be an entrance interphone and is an interphone shared by the resident of the housing 51 and the visitor. The extra-housing interphone 58 is provided with the same function as the extra-housing interphone 34 of the exemplary embodiment. The reader 60 has the same function as the housing entrance reader 36 of the exemplary embodiment.

25   **[0060]**       The entrance controller 64 corresponds to the

housing entrance controller 38 of the exemplary embodiment.

The entrance controller 64 communicates with the entrance door 56, the extra-housing interphone 58, the reader 60, and the intra-housing interphone 62 to control these devices. In  
5 this variation, the entrance controller 64 is integrated with the intra-housing interphone 62. Stated otherwise, the function of the entrance controller 64 is built in the intra-housing interphone 62.

**[0061]** A description will be given of the operation of  
10 the interphone system 50 a housing having the configuration described above. First, the operation performed when a resident of the housing 51 or a visitor other than the residents attempts to enter the house 52 from the entrance 54 will be described. When an unlocking operation by a person  
15 attempting to enter the house 52 (also referred to as "person to be authenticated") using the smart key 42 is input, i.e., when near field communication with the smart key 42 in the unlocking mode is started, the reader 60 reads, from the smart key 42, the authentication information stored in the  
20 smart key 42 and related to the person to be authenticated. The reader 60 transmits the authentication information read from the smart key 42 to the entrance controller 64. The authentication information read from the smart key 42 in this variation can also identify whether the holder of the smart  
25 key 42 is a resident of the housing 51 or a visitor according to the value indicated by the authentication information.

**[0062]**       The entrance controller 64 checks the legitimate authentication information stored in the storage device 40 against the authentication information received from the reader 60 to determine whether the authentication information received from the reader 60 is legitimate. When the authentication information received from the reader 60 is legitimate, the entrance controller 64 determines whether the person to be authenticated is a resident of the housing 51 or a visitor, based on the value indicated by the authentication information. When the entrance controller 64 determines that the person to be authenticated is a visitor based on the authentication information, the entrance controller 64 may perform the following steps on the condition that permission information indicating permission of entrance to the house 52 is mapped to the authentication information.

**[0063]**       When the person to be authenticated is determined to be a resident of the housing 51, the entrance controller 64 makes the entrance door 56 openable by transmitting a signal for unlocking the door to the entrance door 56.

**[0064]**       When the person to be authenticated is determined to be a visitor, the entrance controller 64 controls the extra-housing interphone 58 to start the process of capturing an image of the person to be authenticated (hereinafter, referred to as a visitor). Along with this, the entrance controller 64 controls the intra-housing interphone 62 to cause the intra-housing interphone 62 to perform an intra-

housing call process (outputting a chime sound, etc.). The entrance controller 64 stands by for a predetermined period of time (e.g., several seconds to several tens of seconds) and then makes the entrance door 56 openable by transmitting  
5 a signal for unlocking the door to the entrance door 56.

**[0065]** Subsequently, the entrance controller 64 ends the imaging process performed by the extra-housing interphone 58. The entrance controller 64 acquires the data for the result of imaging from the extra-housing interphone 58 (which can be  
10 said to be recording data capturing an image of the visitor) and transmits the data for the result of imaging to the intra-housing interphone 62. The data for the result of imaging transmitted to the intra-housing interphone 30 may include the authentication information on the visitor (or the  
15 identification information on the visitor identified by the authentication information). Further, the entrance controller 64 stores the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the visitor (or the identification information  
20 on the resident identified by the authentication information).

**[0066]** The operation performed when a resident of the housing 51 or a visitor leaves the house 52 from the entrance 54 will now be described. When a locking operation by a  
25 person attempting to leave the house 52 (also referred to as "person to be authenticated") using the smart key 42 is

input, i.e., when near field communication with the smart key 42 in the locking mode is started, the reader 60 reads, from the smart key 42, the authentication information stored in the smart key 42 and related to the person to be

5 authenticated. The reader 60 transmits the authentication information read from the smart key 42 to the entrance controller 64.

**[0067]** As already described, the entrance controller 64 determines whether the person to be authenticated is a  
10 resident of the housing 51 or a visitor, based on the authentication information received from the reader 60. When the person to be authenticated is determined to be a resident of the housing 51, the entrance controller 64 locks the entrance door 56 by transmitting a signal for locking the  
15 door to the entrance door 56.

**[0068]** When the person to be authenticated is determined to be a visitor, the entrance controller 64 controls the extra-housing interphone 58 to start the process of capturing an image of the person to be authenticated (hereinafter,  
20 referred to as a visitor). The entrance controller 64 stands by for a predetermined period of time (e.g., several seconds to several tens of seconds) and then locks the entrance door 56 by transmitting a signal for locking the door to the entrance door 56.

25 **[0069]** Subsequently, the entrance controller 64 ends the imaging process performed by the extra-housing interphone 58.

The entrance controller 64 acquires the data for the result of imaging from the extra-housing interphone 58 (which can be said to be recording data capturing an image of the visitor) and transmits the data for the result of imaging to the intra-housing interphone 62. The data for the result of imaging transmitted to the intra-housing interphone 62 may include the authentication information on the visitor (or the identification information on the visitor identified by the authentication information). Further, the entrance controller 64 stores the data for the result of imaging in the storage device 40, mapping the data to the authentication information on the visitor (or the identification information on the resident identified by the authentication information).

**[0070]** The interphone system 50 for a housing of this variation also provides the same advantage as the interphone system 20 for a housing complex according to the exemplary embodiment. For example, the interphone system 50 for a housing switches the security related process depending on whether the person attempting to enter or leave by using the smart key 42 is a resident of the housing 51 or a visitor. This makes it possible to meet both security and convenience requirements in entrance and exit in the housing 51 using the smart key 42.

**[0071]** Any combination of the exemplary embodiment and the variation described above will also be useful as an

embodiment of the present disclosure. New embodiments created by the combination provide the advantages of exemplary embodiment and the variation combined. It will also be understood by skilled persons that the functions that the constituting elements recited in the claims should achieve are implemented either alone or in combination by the constituting elements shown in the exemplary embodiment and the variations.

**[0072]** The technologies according to the embodiment and variations may be defined by the following items.

[Item 1]

An interphone system (20) for a housing complex, including: a shared interphone (24) and a first reader (26) provided in a shared entrance (16) of a housing complex (10);

an intra-housing interphone (30) provided in each housing of the housing complex (10); and

a first controller (28) that controls at least the shared interphone (24) and the intra-housing interphone (30), wherein

the shared interphone (24) captures an image of a person located in the shared entrance (16),

when an authentication operation by the person using a smart key (42) is input, the first reader (26) transmits authentication information related to the person to the first controller (28), and

the first controller (28)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of  
5 the housing complex (10), transmits a signal for unlocking a door (22) of the shared entrance (16), and

(3) when the person is determined to be a visitor, causes the shared interphone (24) to output a content that prompts the visitor to input a room number, and, when the  
10 room number is input in the shared interphone (24), transmits a signal for unlocking the door (22) of the shared entrance (16) and transmits a result of imaging by the shared interphone (24) to the intra-housing interphone (30) corresponding to the room number input.

15 [Item 2]

The interphone system (20) for a housing complex according to item 1, wherein, when the shared interphone (24) receives an operation in a ringer button provided in the shared interphone (24), the shared interphone (24) starts  
20 capturing an image of the person.

[Item 3]

The interphone system (20) for a housing complex according to item 1, wherein the shared interphone (24) starts capturing an image of the person when a registration  
25 number communicated to the visitor in advance is input.

[Item 4]

The interphone system (20) for a housing complex according to any one of items 1 through 3, further including: a housing entrance interphone (34) and a second reader (36) provided in a housing entrance in the housing complex; and

5        a second controller (38) that controls at least the housing entrance interphone (34) and the intra-housing interphone (30), wherein

when an unlocking operation by the person using a smart key (42) is input, the second reader (36) transmits  
10 authentication information related to the person to the second controller (38), and

the second controller (38)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the  
15 authentication information,

(2) when the person is determined to be a resident of the housing complex (10), transmits a signal for unlocking a door (32) of the housing entrance, and

(3) when the person is determined to be a visitor,  
20 causes the housing entrance interphone (34) to start capturing an image of the visitor, transmits a signal for unlocking the door (32) of the housing entrance, and transmits a result of imaging the visitor by the housing entrance interphone (34) to the intra-housing interphone  
25 (30).

[Item 5]

The interphone system (20) for a housing complex according to item 4, wherein, when a locking operation by the person using a smart key (42) is input, the second reader (36) transmits authentication information related to the person to the second controller (38), and

the second controller (38)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of the housing complex (10), transmits a signal for locking the door (32) of the housing entrance, and

(3) when the person is determined to be a visitor, causes the housing entrance interphone (34) to start capturing an image of the visitor, transmits a signal for locking the door (32) of the housing entrance, and transmits a result of imaging the visitor by the housing entrance interphone (34) to the intra-housing interphone (30).

[Item 6]

The interphone system (20) for a housing complex according to item 4 or 5, wherein the second controller (38) is integrated with the intra-housing interphone (30).

[Item 7]

An interphone system (20) for a housing complex, including: a shared interphone (24) and a reader (26) provided in a shared entrance (16) of a housing complex (10);

an intra-housing interphone (30) provided in each housing of the housing complex (10); and

a controller (28) that controls at least the shared interphone (24) and the intra-housing interphone (30),

5 wherein

when an authentication operation by a person using a smart key (42) is input, the reader (26) transmits authentication information related to the person to the controller (28), and

10 the controller (28)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the authentication information,

(2) when the person is determined to be a visitor,  
15 causes the shared interphone (24) to capture an image of the visitor for a predetermined period of time and transmits a result of imaging by the shared interphone (24) to the intra-housing interphone (30).

[Item 8]

20 An interphone system (20) for a housing complex, including: a camera (24) and a reader (26) provided in a shared entrance (16) of a housing complex (10);

an intra-housing interphone (30) provided in each housing of the housing complex (10); and

25 a controller (28) that controls at least the camera (24) and the intra-housing interphone (30), wherein

when an authentication operation by a person using a smart key (42) is input, the reader (26) transmits authentication information related to the person to the controller (28), and

5       the controller (28)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the authentication information,

(2) when the person is determined to be a visitor,  
10 causes the camera (24) to capture an image of the visitor for a predetermined period of time and transmits a result of imaging by the camera (24) to the intra-housing interphone (30).

[Item 9]

15       An interphone system (50) for a housing, including: an entrance interphone (58) and a reader (60) provided in an entrance (54) of a housing (51);

an intra-housing interphone (61) provided in the housing (52); and

20       a controller (64) that controls at least the entrance interphone (58) and the intra-housing interphone (62), wherein

when an authentication operation by a person using a smart key (42) is input, the reader (60) transmits  
25 authentication information related to the person to the controller (64), and

the controller (64)

(1) determines whether the person is a resident of the housing complex (10) or a visitor, based on the authentication information,

5       (2) when the person is determined to be a resident of the housing (51), transmits a signal for unlocking a door (56) of the entrance, and

(3) when the person is determined to be a visitor, causes the entrance interphone (58) to start capturing an  
10 image of the visitor, transmits a signal for unlocking the door (56) of the entrance, and transmits a result of imaging the visitor by the entrance interphone (58) to the intra-housing interphone (30).

[Item 10]

15       The interphone system (50) for a housing according to item 9, wherein, when a locking operation by a person using a smart key (42) is input, the reader (60) transmits authentication information related to the person to the controller (64), and

20       the controller (64)

(1) determines whether the person is a resident of the housing (51) or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of  
25 the housing (51), transmits a signal for locking a door (56) of the entrance, and

(3) when the person is determined to be a visitor, causes the entrance interphone (58) to start capturing an image of the visitor, transmits a signal for locking the door (56) of the entrance, and transmits a result of imaging the visitor by the entrance interphone (58) to the intra-housing interphone (62).

[Item 11]

The interphone system (50) for a housing according to item 9 or 10, wherein the controller (64) is integrated with the intra-housing interphone (62).

[INDUSTRIAL APPLICABILITY]

**[0073]** The technology of the present disclosure can be used in an interphone system for a housing complex or an independent housing.

15 [REFERENCE SIGNS LIST]

**[0074]** 20 interphone system for housing complex, 24 shared interphone, 26 shared entrance reader, 28 shared entrance controller, 30 intra-housing interphone, 34 extra-housing interphone, 36 housing entrance reader, 38 housing entrance controller, 42 smart key, 50 interphone system for housing, 58 extra-housing interphone, 60 reader, 62 intra-housing interphone, 64 entrance controller

## [CLAIMS]

1. An interphone system for a housing complex,  
comprising:

a shared interphone and a first reader provided in a  
shared entrance of a housing complex;

an intra-housing interphone provided in each housing of  
the housing complex; and

a first controller that controls at least the shared  
interphone and the intra-housing interphone, wherein

the shared interphone captures an image of a person  
located in the shared entrance,

when an authentication operation by the person using a  
smart key is input, the first reader transmits authentication  
information related to the person to the first controller,  
and

the first controller

(1) determines whether the person is a resident of the  
housing complex or a visitor, based on the authentication  
information,

(2) when the person is determined to be a resident of  
the housing complex, transmits a signal for unlocking a door  
of the shared entrance, and

(3) when the person is determined to be a visitor,  
causes the shared interphone to output a content that prompts  
the visitor to input a room number, and, when the room number  
is input in the shared interphone, transmits a signal for

unlocking the door of the shared entrance and transmits a result of imaging by the shared interphone to the intra-housing interphone corresponding to the room number input.

2. The interphone system for a housing complex according to claim 1, wherein

when the shared interphone receives an operation in a ringer button provided in the shared interphone, the shared interphone starts capturing an image of the person.

3. The interphone system for a housing complex according to claim 1, wherein

the shared interphone starts capturing an image of the person when a registration number communicated to the visitor in advance is input.

4. The interphone system for a housing complex according to any one of claims 1 through 3, further comprising:

a housing entrance interphone and a second reader provided in a housing entrance in the housing complex; and

a second controller that controls at least the housing entrance interphone and the intra-housing interphone, wherein

when an unlocking operation by the person using a smart key is input, the second reader transmits authentication information related to the person to the second controller,

and

the second controller

(1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of the housing complex, transmits a signal for unlocking a door of the housing entrance, and

(3) when the person is determined to be a visitor, causes the housing entrance interphone to start capturing an image of the visitor, transmits a signal for unlocking the door of the housing entrance, and transmits a result of imaging the visitor by the housing entrance interphone to the intra-housing interphone.

5. The interphone system for a housing complex according to claim 4, wherein

when a locking operation by the person using a smart key is input, the second reader transmits authentication information related to the person to the second controller, and

the second controller

(1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of

the housing complex, transmits a signal for locking the door of the housing entrance, and

(3) when the person is determined to be a visitor, causes the housing entrance interphone to start capturing an image of the visitor, transmits a signal for locking the door of the housing entrance, and transmits a result of imaging the visitor by the housing entrance interphone to the intra-housing interphone.

6. The interphone system for a housing complex according to claim 4 or 5, wherein

the second controller is integrated with the intra-housing interphone.

7. An interphone system for a housing complex, comprising:

a shared interphone and a reader provided in a shared entrance of a housing complex;

an intra-housing interphone provided in each housing of the housing complex; and

a controller that controls at least the shared interphone and the intra-housing interphone, wherein

when an authentication operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller, and

the controller

(1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information,

(2) when the person is determined to be a visitor, causes the shared interphone to capture an image of the visitor for a predetermined period of time and transmits a result of imaging by the shared interphone to the intra-housing interphone.

8. An interphone system for a housing complex, comprising:

a camera and a reader provided in a shared entrance of a housing complex;

an intra-housing interphone provided in each housing of the housing complex; and

a controller that controls at least the camera and the intra-housing interphone, wherein

when an authentication operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller, and the controller

(1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information,

(2) when the person is determined to be a visitor, causes the camera to capture an image of the visitor for a

predetermined period of time and transmits a result of imaging by the camera to the intra-housing interphone.

9. An interphone system for a housing, comprising:  
an entrance interphone and a reader provided in an entrance of a housing;

an intra-housing interphone provided in the housing;  
and

a controller that controls at least the entrance interphone and the intra-housing interphone, wherein

when an authentication operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller,

the controller

(1) determines whether the person is a resident of the housing complex or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of the housing, transmits a signal for unlocking a door of the entrance, and

(3) when the person is determined to be a visitor, causes the entrance interphone to start capturing an image of the visitor, transmits a signal for unlocking the door of the entrance, and transmits a result of imaging the visitor by the entrance interphone to the intra-housing interphone.

10. The interphone system for a housing according to claim 9, wherein

when a locking operation by a person using a smart key is input, the reader transmits authentication information related to the person to the controller, and

the controller

(1) determines whether the person is a resident of the housing or a visitor, based on the authentication information,

(2) when the person is determined to be a resident of the housing, transmits a signal for locking a door of the entrance, and

(3) when the person is determined to be a visitor, causes the entrance interphone to start capturing an image of the visitor, transmits a signal for locking the door of the entrance, and transmits a result of imaging the visitor by the entrance interphone to the intra-housing interphone.

11. The interphone system for a housing according to claim 9 or 10, wherein

the controller is integrated with the intra-housing interphone.