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(54) **LOGIN AND LOGOUT SYSTEM, ELECTRONIC DEVICE AND RECORDING MEDIUM**

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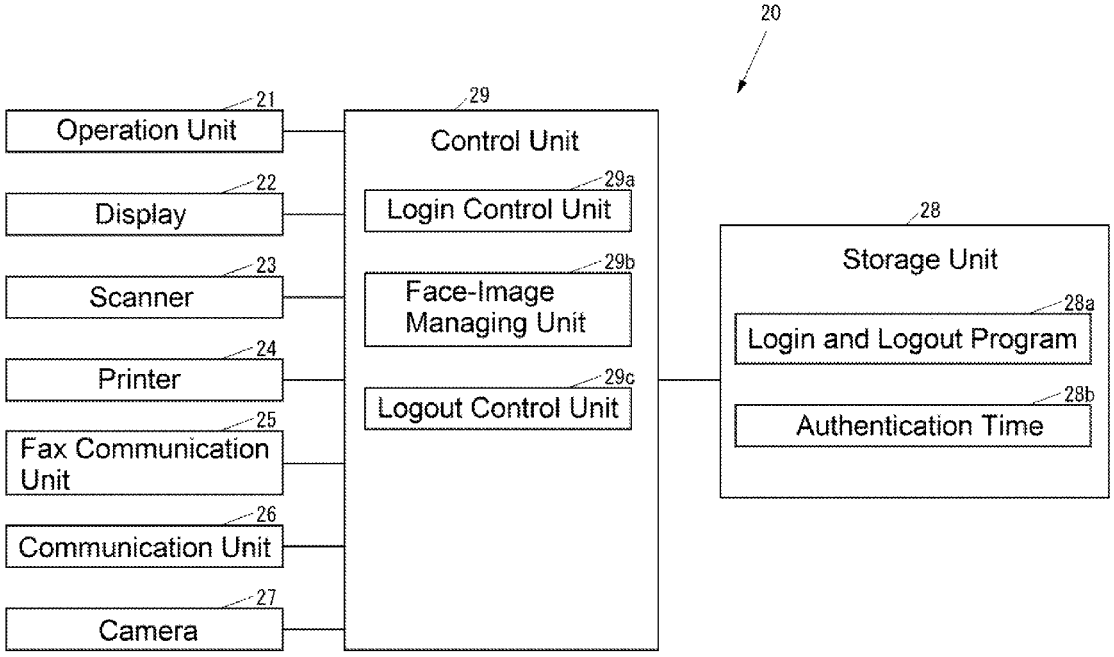
(57) **ABSTRACT**

A login and logout system includes an electronic device, a camera, a storage device, a login control unit, a face-image managing unit, and a logout control unit. The login control unit controls a login of a user of the electronic device. The face-image managing unit manages a face image of the user. The logout control unit controls a logout of the user. The face-image managing unit writes the face image that is captured by the camera at a specific timing pertaining to the login permitted by the login control unit to the storage device. After the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user becomes unauthenticated by a face authentication based on the face image captured by the camera and the face image stored in the storage device.



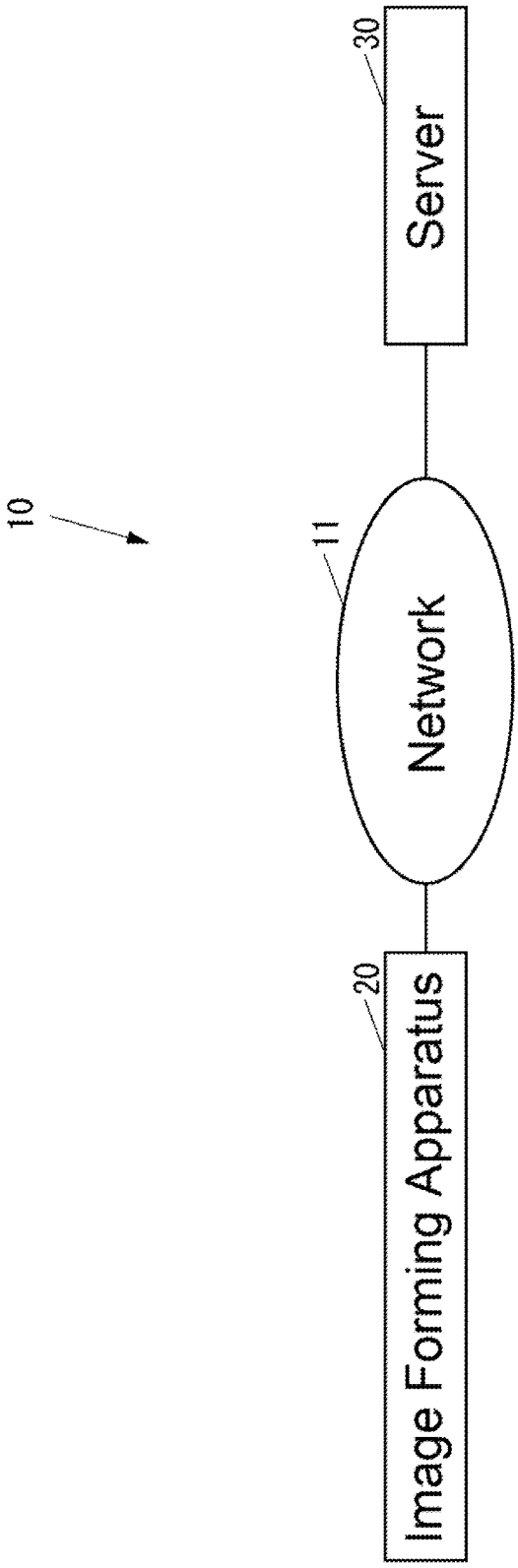


FIG. 1

FIG. 2

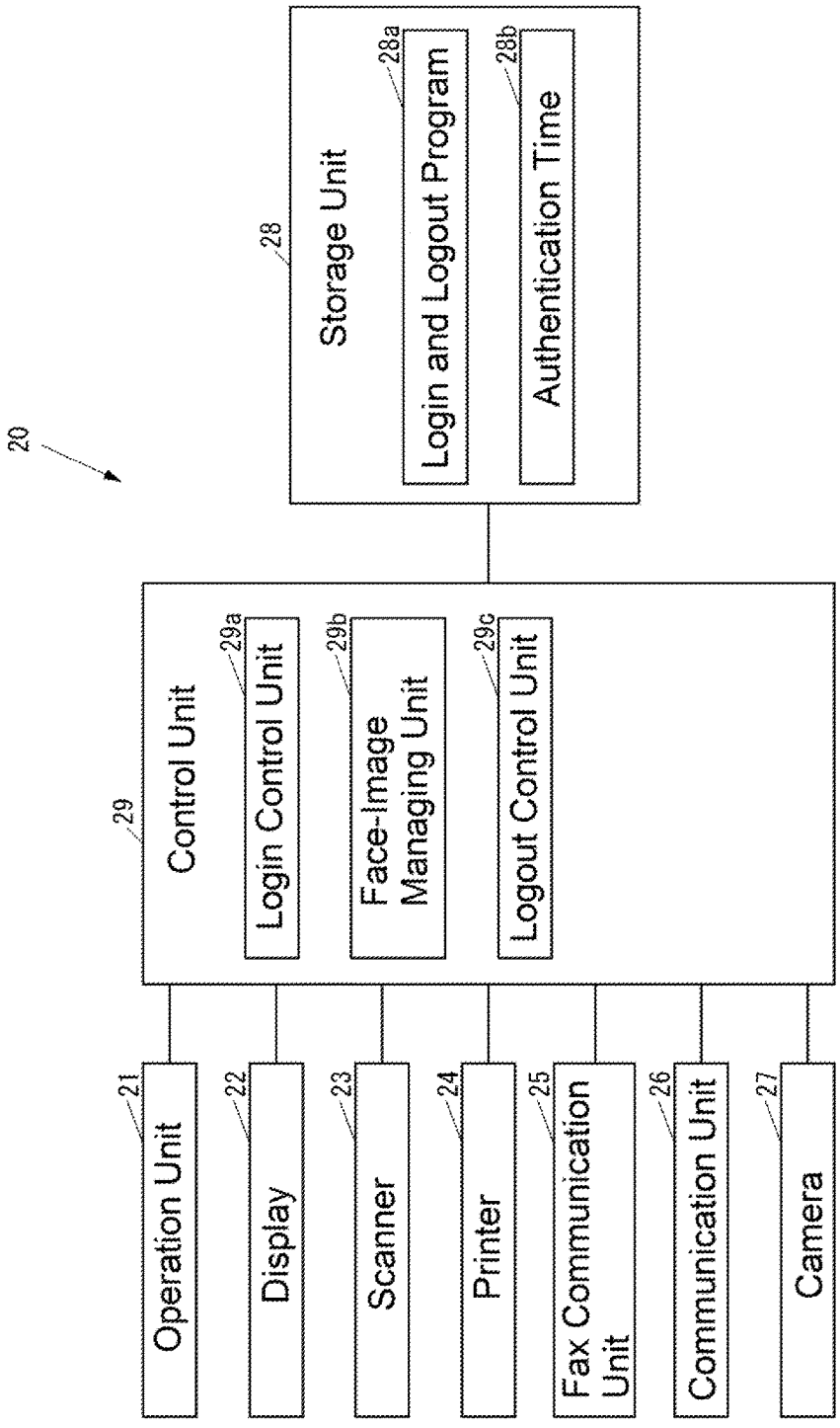

20
28
Storage Unit
28a
Login and Logout Program
28b
Authentication Time
29
Control Unit
29a
Login Control Unit
29b
Face-Image Managing Unit
29c
Logout Control Unit
21
Operation Unit
22
Display
23
Scanner
24
Printer
25
Fax Communication Unit
26
Communication Unit
27
Camera

FIG. 3

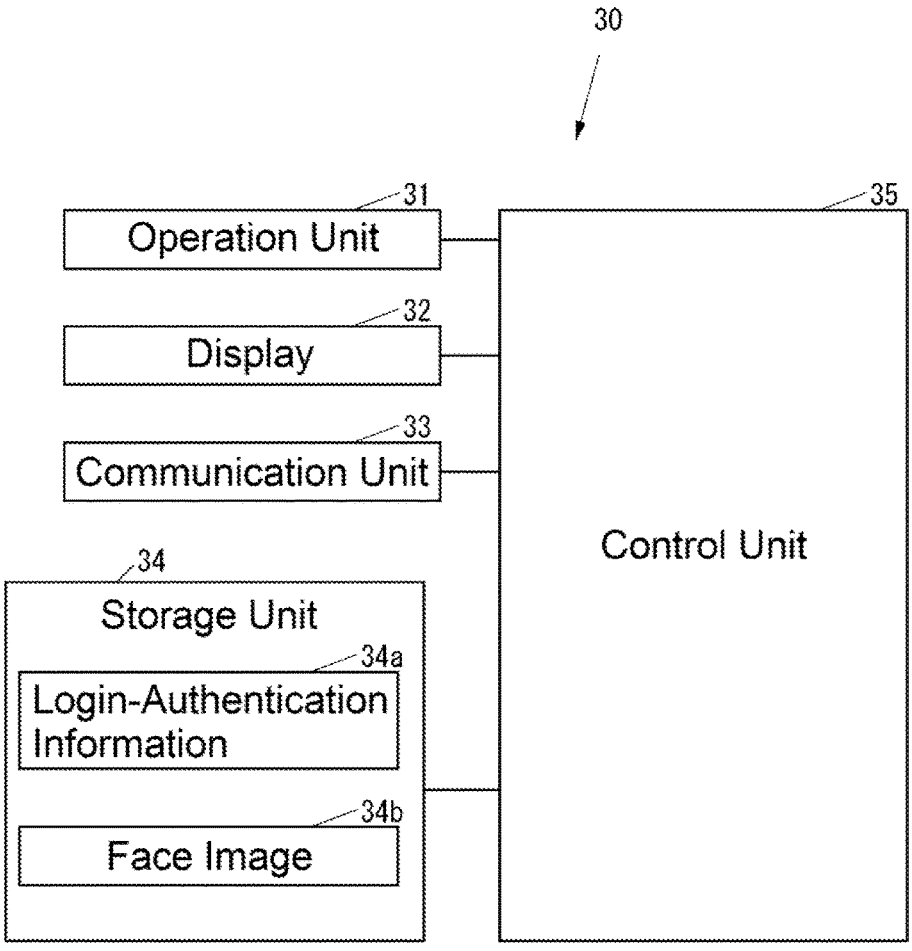

30
31
Operation Unit
32
Display
33
Communication Unit
34
Storage Unit
34a
Login-Authentication Information
34b
Face Image
35
Control Unit

FIG. 4

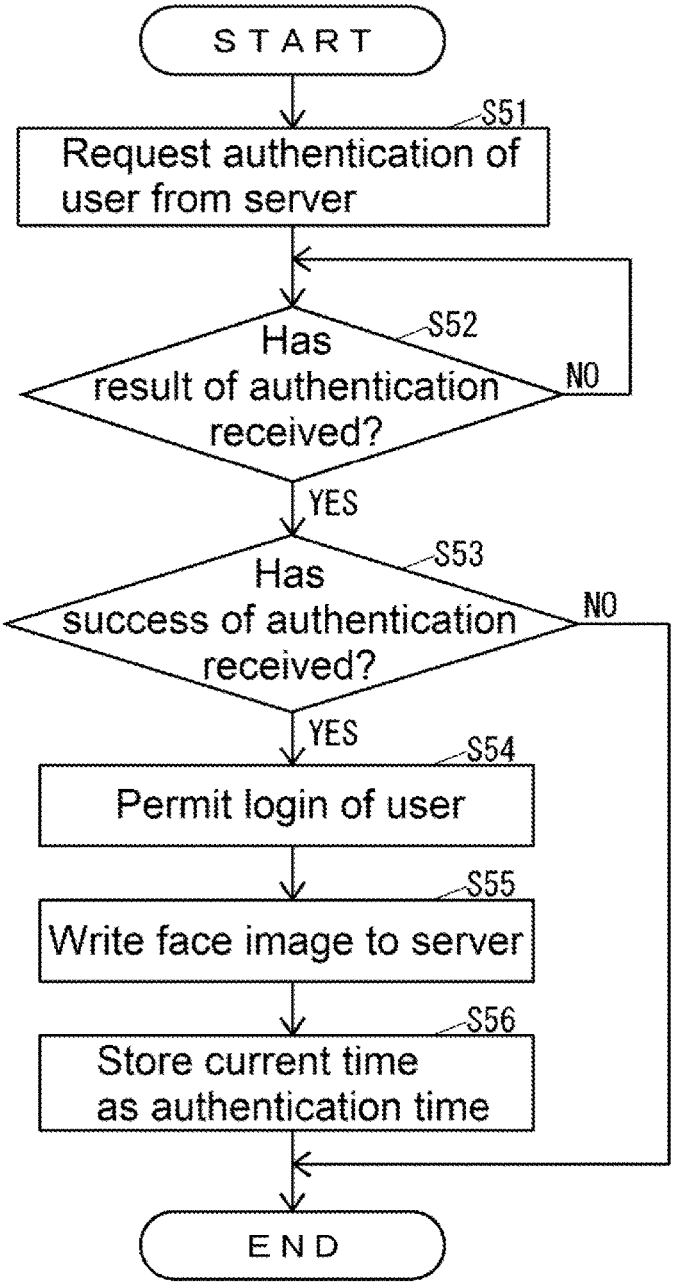
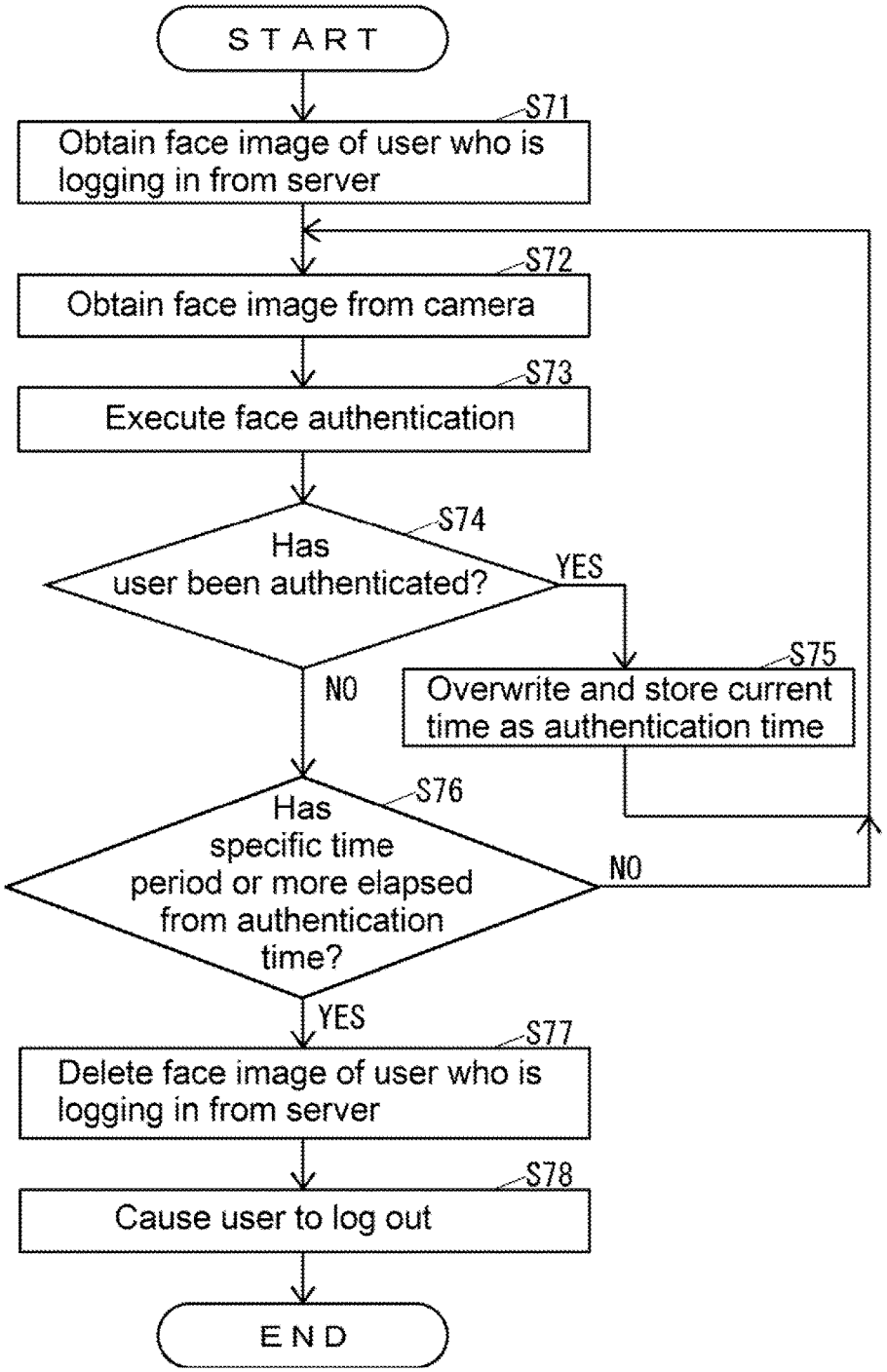

START
S51
Request authentication of user from server
S52
Has result of authentication received?
NO
YES
S53
Has success of authentication received?
NO
YES
S54
Permit login of user
S55
Write face image to server
S56
Store current time as authentication time
END

FIG. 5


START
S71
Obtain face image of user who is logging in from server
S72
Obtain face image from camera
S73
Execute face authentication
S74
Has user been authenticated?
YES
NO
S75
Overwrite and store current time as authentication time
S76
Has specific time period or more elapsed from authentication time?
NO
YES
S77
Delete face image of user who is logging in from server
S78
Cause user to log out
END

LOGIN AND LOGOUT SYSTEM, ELECTRONIC DEVICE AND RECORDING MEDIUM

INCORPORATION BY REFERENCE

[0001] This application is based upon, and claims the benefit of priority from, corresponding Japanese Patent Application No. 2017-147388 filed in the Japan Patent Office on Jul. 31, 2017, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] Unless otherwise indicated herein, the description in this section is not prior art to the claims in this application and is not admitted to be prior art by inclusion in this section.

[0003] There is known a technique that permits a login of a user when the user is authenticated by a face authentication based on a face image captured by a camera and a face image that has been preliminarily registered. After this technique has permitted the login of the user, the technique causes the user to log out when the user becomes unauthenticated by the face authentication based on the face image captured by the camera and the face image that has been preliminarily registered.

SUMMARY

[0004] A login and logout system according to one aspect of the disclosure includes an electronic device, a camera, a storage device, a login control unit, a face-image managing unit, and a logout control unit. The login control unit controls a login of a user of the electronic device. The face-image managing unit manages a face image of the user. The logout control unit controls a logout of the user. The face-image managing unit writes the face image that is captured by the camera at a specific timing pertaining to the login permitted by the login control unit to the storage device. After the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user becomes unauthenticated by a face authentication based on the face image captured by the camera and the face image stored in the storage device.

[0005] These as well as other aspects, advantages, and alternatives will become apparent to those of ordinary skill in the art by reading the following detailed description with reference where appropriate to the accompanying drawings. Further, it should be understood that the description provided in this summary section and elsewhere in this document is intended to illustrate the claimed subject matter by way of example and not by way of limitation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** illustrates a block diagram illustrating a login and logout system according to one embodiment of the disclosure.

[0007] FIG. **2** illustrates a block diagram illustrating an image forming apparatus according to one embodiment in a case of an MFP.

[0008] FIG. **3** illustrates a block diagram illustrating a server according to the one embodiment.

[0009] FIG. **4** illustrates operations of the image forming apparatus according to the one embodiment when a user logs in.

[0010] FIG. **5** illustrates operations of the image forming apparatus according to the one embodiment when causing a user to automatically log out.

DETAILED DESCRIPTION

[0011] Example apparatuses are described herein. Other example embodiments or features may further be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented herein. In the following detailed description, reference is made to the accompanying drawings, which form a part thereof.

[0012] The example embodiments described herein are not meant to be limiting. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the drawings, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

[0013] The following describes one embodiment of the disclosure by referring to the attached drawings.

[0014] First, a description will be given of a configuration of a login and logout system according to an embodiment.

[0015] FIG. **1** illustrates a block diagram illustrating a login and logout system **10** according to the embodiment.

[0016] As illustrated in FIG. **1**, the login and logout system **10** includes an image forming apparatus **20** as an electronic device and a server **30** as electronic devices. The image forming apparatus **20** and the server **30** can be connected via a network **11**, such as a local area network (LAN) or the Internet.

[0017] The login and logout system **10** ensures including one or more image forming apparatuses other than the image forming apparatus **20**. The image forming apparatus included in the login and logout system **10** is an image forming apparatus, such as a multifunction peripheral (MFP), a printer-only machine, a copy-only machine, a FAX-only machine, or a scanner-only machine.

[0018] FIG. **2** illustrates a block diagram illustrating the image forming apparatus **20** in a case of an MFP.

[0019] The image forming apparatus **20** illustrated in FIG. **2** is a computer that includes an operation unit **21**, a display **22**, a scanner **23**, a printer **24**, a fax communication unit **25**, a communication unit **26**, a camera **27**, a storage unit **28**, and a control unit **29**. The operation unit **21** is an input device, such as buttons by which various kinds of operations are entered. The display **22** is a display device, such as a liquid crystal display (LCD) that displays various kinds of information. The scanner **23** is a reading device that reads an image from a document. The printer **24** is a print device that prints an image to a recording medium, such as a paper sheet. The fax communication unit **25** is a fax device that performs fax communications with an external facsimile device (not illustrated) via a communication line, such as a dial-up line. The communication unit **26** is a communication device that communicates with an external device via the network **11** (see FIG. **1**) or directly by wired or wireless communications without via the network **11**. The camera **27** is located at a position where the camera **27** can capture a face image of a person situated in front of the image forming apparatus **20**. The storage unit **28** is a non-volatile storage device, such as a semiconductor memory or a hard disk drive (HDD) that stores various kinds of information. The control unit **29** controls the whole image forming apparatus **20**.

[0020] The storage unit **28** stores a login and logout program **28***a* for controlling a login and a logout of a user. The login and logout program **28***a* may be installed onto the image forming apparatus **20** at production stage of the image forming apparatus **20**, may be additionally installed onto the image forming apparatus **20** from an external storage medium, such as a universal serial bus (USB) memory, and may be additionally installed onto the image forming apparatus **20** from the network **11**.

[0021] The storage unit **28** is configured to store an authentication time **28***b* that indicates a time at which authentication of a user is executed.

[0022] The control unit **29** includes, for example, a central processing unit (CPU), a read-only memory (ROM) that stores programs and various kinds of data, and a random-access memory (RAM) that is used as a work area of the CPU. The CPU executes the programs stored in the ROM or the storage unit **28**.

[0023] The control unit **29** executes the login and logout program **28***a* to achieve a login control unit **29***a* that controls the login of a user of the image forming apparatus **20**, a face-image managing unit **29***b* that manages the face image of the user of the image forming apparatus **20**, and a logout control unit **29***c* that controls the logout of the user of the image forming apparatus **20**.

[0024] FIG. **3** illustrates a block diagram illustrating the server **30**.

[0025] As illustrated in FIG. **3**, the server **30** includes: an operation unit **31** that is an input device, such as a keyboard and a computer mouse by which various kinds of operations are entered; a display **32** that is a display device, such as an LCD that displays various kinds of information; a communication unit **33** that is a communication device that communicates with an external device via the network **11** (see FIG. **1**) or directly by wired or wireless communications without via the network **11**; a storage unit **34** that is a non-volatile storage device, such as a semiconductor memory and an HDD that stores various kinds of information; and a control unit **35** that controls the whole server **30**.

[0026] The storage unit **34** stores login-authentication information **34***a* for authentication at the login of the user of the image forming apparatus **20** included in the login and logout system **10** (see FIG. **1**). The login-authentication information **34***a* is information for an authentication method other than a face authentication based on the face image captured by the camera **27**. For example, the login-authentication information **34***a* may be identification information of an integrated circuit (IC) card or may be a combination of an ID and a password.

[0027] The storage unit **34** is configured to store a face image **34***b* of the user of the image forming apparatus **20** included in the login and logout system **10**.

[0028] The control unit **35** includes, for example, a CPU, a ROM that stores the programs and various kinds of data, and a RAM that is used as a work area of the CPU. The CPU executes the programs stored in the ROM or the storage unit **34**.

[0029] Next, a description will be given of operations of the login and logout system **10**.

[0030] First, a description will be given of operations of the image forming apparatus **20** when a user logs in.

[0031] FIG. **4** illustrates the operations of the image forming apparatus **20** when a user logs in.

[0032] When a user instructs the login by entering the login-authentication information for authentication at the login, the control unit **29** of the image forming apparatus **20** executes the operations illustrated in FIG. **4**.

[0033] As illustrated in FIG. **4**, the login control unit **29***a* requests the authentication of the user from the server **30** by transmitting the login-authentication information entered by the user to the server **30** (Step S**51**) and determines whether a result of the authentication by the server **30** has been received or not until determining the reception of the result of the authentication by the server **30** (Step S**52**).

[0034] Here, when the authentication of the user is requested from the image forming apparatus **20**, the control unit **35** of the server **30** determines whether the login-authentication information **34***a* identical to the login-authentication information transmitted from the image forming apparatus **20** is stored or not. Then, when the login-authentication information **34***a* identical to the login-authentication information transmitted from the image forming apparatus **20** is stored, the control unit **35** transmits a success of the authentication as a result of the authentication to the image forming apparatus **20**. On the other hand, when the login-authentication information **34***a* identical to the login-authentication information transmitted from the image forming apparatus **20** is not stored, the control unit **35** transmits a failure of the authentication as a result of the authentication to the image forming apparatus **20**.

[0035] When the login control unit **29***a* determines the reception of the result of the authentication by the server **30** at Step S**52**, the login control unit **29***a* determines whether the success of the authentication as a result of the authentication has been received or not (Step S**53**).

[0036] When the login control unit **29***a* determines no reception of the success of the authentication as a result of the authentication, that is, the reception of the failure of the authentication at Step S**53**, the login control unit **29***a* terminates the operations illustrated in FIG. **4**.

[0037] When it is determined that the reception of the success of the authentication as a result of the authentication at Step S**53**, the login control unit **29***a* permits the login of the user (Step S**54**).

[0038] Subsequently, the face-image managing unit **29***b* writes the face image captured by the camera **27** at a specific timing pertaining to the login permitted at Step S**54** to the server **30** (Step S**55**). The control unit **35** of the server **30** stores the face image writing of which is instructed from the image forming apparatus **20** as the face image **34***b* associated with the identification information of the user permitted to log in at Step S**54**.

[0039] Here, the specific timing pertaining to the login can be considered to be a timing at the login, or various timings before and after the login. For example, the specific timing pertaining to the login may be the timing at which the login of the user is permitted at Step S**54**. Alternatively, when there is a login button for starting login processing, the specific timing pertaining to the login may be the timing at which the login button is pressed. Further, when the login-authentication information is the identification information of the IC card, the specific timing pertaining to the login may be the timing at which the IC card is read for the login by an IC card reader of the operation unit **21**. Furthermore, when the login-authentication information is the combination of the ID and the password, the specific timing pertain-

ing to the login may be the time at which at least one of the ID and the password is entered from the operation unit **21**.

[0040] The face image written to the server **30** at Step S**55** may be one, or may be a plurality of face images captured by the camera **27** at mutually different timings. Typically, in the face authentication, a configuration that compares a target face image with a plurality of face images has higher accuracy in authentication than a configuration that compares a target face image with one face image.

[0041] After the process at Step S**55**, the logout control unit **29***c* stores a current time as the authentication time **28***b* (Step S**56**) to terminate the operations illustrated in FIG. **4**.

[0042] Next, a description will be given of the operations of the image forming apparatus **20** when causing a user to automatically log out.

[0043] FIG. **5** illustrates the operations of the image forming apparatus **20** when causing a user to automatically log out.

[0044] After a user has logged in, the control unit **29** of the image forming apparatus **20** executes the operations illustrated in FIG. **5** until the user logs out.

[0045] As illustrated in FIG. **5**, the logout control unit **29***c* obtains the face image of the user who is logging in from the server **30** by transmitting the identification information of the user who is logging in to the server **30** (Step S**71**). The control unit **35** of the server **30** transmits the face image **34***b*, which has been stored associated with the identification information transmitted from the image forming apparatus **20**, to the image forming apparatus **20**.

[0046] After the process at Step S**71**, the logout control unit **29***c* obtains the face image from the camera **27** (Step S**72**).

[0047] Subsequently, the logout control unit **29***c* executes the face authentication based on the face image obtained at Step S**71** and the face image obtained at Step S**72** (Step S**73**). That is, the logout control unit **29***c* compares the face image obtained at Step S**71** with the face image obtained at Step S**72**, determines that the user is authenticated when a similarity degree of the face image obtained at Step S**71** and the face image obtained at Step S**72** is equal to or more than a specific degree, and determines that the user is unauthenticated when a similarity degree of the face image obtained at Step S**71** and the face image obtained at Step S**72** is less than a specific degree.

[0048] After the process at Step S**73**, the logout control unit **29***c* determines whether the user has been authenticated or not as a result of the face authentication at Step S**73** (Step S**74**).

[0049] When the logout control unit **29***c* determines that the user has been authenticated at Step S**74**, the logout control unit **29***c* overwrites and stores the current time as the authentication time **28***b* (Step S**75**) and then executes Step S**72**.

[0050] When the logout control unit **29***c* determines that the user has not been authenticated at Step S**74**, the logout control unit **29***c* determines whether a specific time period or more has elapsed from the authentication time **28***b* or not (Step S**76**). Here, the specific time period may be a fixed time period, or may be a random time period.

[0051] When the logout control unit **29***c* determines that the specific time period or more has not elapsed from the authentication time **28***b* at Step S**76**, the logout control unit **29***c* executes the process at Step S**72**.

[0052] When the logout control unit **29***c* determines that the specific time period or more has elapsed from the authentication time **28***b* at Step S**76**, the face-image managing unit **29***b* deletes the face image of the user who is logging in from the server **30** by transmitting the identification information of the user who is logging in to the server **30** (Step S**77**). The control unit **35** of the server **30** deletes the face image **34***b* deletion of which is instructed from the image forming apparatus **20**, that is, the face image **34***b* stored associated with the identification information that has been transmitted from the image forming apparatus **20** at Step S**77** from the storage unit **34**.

[0053] After the process at Step S**77**, the logout control unit **29***c* causes the user who is logging in to log out (Step S**78**) to terminate the operations in FIG. **5**.

[0054] As described above, the login and logout system **10** causes the user to log out (Step S**78**) when the user becomes unauthenticated for a specific time period or more (NO at Step S**74**) by the face authentication at Step S**73** based on the face image that is captured by the camera **27** at the specific timing pertaining to the login permitted at Step S**54** and the face image captured by the camera **27** each time. Thus, the login and logout system **10** does not unnecessarily cause the user to log out when the external appearance of the user does not significantly change in a short period of time from the specific timing pertaining to the login permitted at Step S**54**. Consequently, the login and logout system **10** ensures improvement of appropriateness of an automatic logout.

[0055] When a user is authenticated by an authentication method other than the face authentication based on the face image captured by the camera **27** (YES at Step S**53**), the login and logout system **10** permits the login of the user (Step S**54**). With this configuration, the login and logout system **10** does not need to store the face image for the login, thus ensuring eliminating a workload for preliminarily storing the face image for the login, eliminating a security risk of an outflow of the face image for the login, and reducing a storage capacity necessary to store the face image for the login.

[0056] The login and logout system **10** may permit the login of a user when the user is authenticated by the face authentication based on the face image captured by the camera **27**.

[0057] The login and logout system **10** deletes the face image **34***b*, which is stored in the storage unit **34** of the server **30** for the logout, from the storage unit **34** of the server **30** by the logout (Step S**77**), thus ensuring the reduced security risk of the outflow of the face image **34***b*, which is stored in the storage unit **34** of the server **30** for the logout, and reducing the storage capacity necessary for the storage unit **34** of the server **30** to store the face image **34***b* for the logout after the logout.

[0058] The login and logout system **10** needs not to delete the face image **34***b*, which is stored in the storage unit **34** of the server **30** for the logout, from the storage unit **34** of the server **30** by the logout.

[0059] The login and logout system **10** does not cause the user to log out if a time period when the user has become unauthenticated is less than the specific time period (NO at Step S**76**) even when the user becomes unauthenticated (NO at Step S**74**) by the face authentication based on the face image that is captured by the camera **27** at the specific timing pertaining to the permitted login and the face image captured by the camera **27** each time. The login and logout system **10**

ensures the improved convenience. For example, the login and logout system **10** ensures the reduced possibility of the logout of the user when the user who is logging in to the image forming apparatus **20** moves away from the image forming apparatus **20** only for a short period of time, and thus ensuring the improved convenience.

[0060] When an error is generated in the image forming apparatus **20**, the user who is logging in to the image forming apparatus **20** is highly likely to move out of the capturing range of the camera **27** for eliminating the error generated in the image forming apparatus **20**. Accordingly, when an error is generated in the image forming apparatus **20**, the login and logout system **10** needs not to cause the user to log out even when the user has become unauthenticated for the specific time period or more by the face authentication based on the face image that is captured by the camera **27** at the specific timing pertaining to the permitted login and the face image captured by the camera **27** each time. For example, when it is determined that the user has not been authenticated at Step S**74** when an error was generated in the image forming apparatus **20**, the image forming apparatus **20** may once halt the operations illustrated in FIG. **5** without executing Step S**76**; after that, when the error is eliminated, the image forming apparatus **20** may determine whether the specific time period or more has elapsed from the authentication time **28***b* or not at Step S**76**, after adding "a time period until the error is eliminated from when the operations illustrated in FIG. **5** was once halted" to the current specific time period.

[0061] In the login and logout system **10**, at least a part of the above-described functions of the image forming apparatus **20** may be achieved by the server **30**. For example, the face authentication may be executed by the server **30**. For example, after obtaining a face image at Step S**72** illustrated FIG. **5**, the logout control unit **29***c* of the image forming apparatus **20** transmits the face image to the server **30** via the communication unit **26**. After obtaining the face image from the image forming apparatus **20**, the control unit **35** of the server **30** executes the process similar to that at Step S**73** to transmit a result of the face authentication to the image forming apparatus **20** via the communication unit **33**. After obtaining the result of the face authentication from the server **30**, the control unit **29** of the image forming apparatus **20** executes the processes at and after Step S**74**. Execution of the face authentication by the server **30** can omit the process at Step S**71**.

[0062] In the login and logout system **10**, at least a part of the above-described functions of the server **30** may be achieved by the image forming apparatus **20**. For example, the image forming apparatus **20** may store the face image that is captured by the camera **27** at the specific timing pertaining to the permitted login to the storage unit **28**. When the image forming apparatus **20** achieves all the above-described functions of the server **30**, the login and logout system **10** needs not to include the server **30**.

[0063] While the login and logout system **10** ensures authentication at the login and storing of the face image by the one server **30** in the embodiment, the login and logout system **10** may ensure the authentication at the login and storage of the face image by different computers.

[0064] While the image forming apparatus **20** includes the camera in the embodiment, the login and logout system **10** may include a camera separately from the image forming apparatus **20**.

[0065] While the electronic device of the disclosure is the image forming apparatus in the embodiment, it may be an electronic device other than an image forming apparatus, such as PC.

[0066] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

What is claimed is:

1. A login and logout system comprising:
an electronic device;
a camera;
a storage device;
a login control unit that controls a login of a user of the electronic device;
a face-image managing unit that manages a face image of the user; and
a logout control unit that controls a logout of the user; wherein
the face-image managing unit writes the face image that is captured by the camera at a specific timing pertaining to the login permitted by the login control unit to the storage device, and
after the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user becomes unauthenticated by a face authentication based on the face image captured by the camera and the face image stored in the storage device.

2. The login and logout system according to claim **1**, wherein when the user is authenticated by an authentication method other than the face authentication based on the face image captured by the camera, the login control unit permits the login of the user.

3. The login and logout system according to claim **1**, wherein when the logout control unit causes the user to log out, the face-image managing unit deletes the face image of the user from the storage device.

4. The login and logout system according to claim **1**, wherein after the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user has become unauthenticated for a specific time period or more by the face authentication based on the face image captured by the camera and the face image stored in the storage device.

5. An electronic device comprising:
a login control unit that controls a login of a user;
a face-image managing unit that manages a face image of the user; and
a logout control unit that controls a logout of the user; wherein
the face-image managing unit writes the face image that is captured by a camera at a specific timing pertaining to the login permitted by the login control unit to a storage device, and
after the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user becomes unauthenticated by a face authentication based on the face image captured by the camera and the face image stored in the storage device.

6. A non-transitory computer-readable recording medium storing a login and logout program, the login and logout program causing a computer to function as:

a login control unit that controls a login of a user;

a face-image managing unit that manages a face image of the user; and

a logout control unit that controls a logout of the user; wherein

the face-image managing unit writes the face image that is captured by a camera at a specific timing pertaining to the login permitted by the login control unit to the storage device, and

after the login of the user is permitted by the login control unit, the logout control unit causes the user to log out when the user becomes unauthenticated by a face authentication based on the face image captured by the camera and the face image stored in the storage device.

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