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(54) **SMART DESK ARRANGEMENT**

(57) A smart desk arrangement comprises a plurality of workplaces (10) and a control device (20). The control device (20) is connected to at least one of the workplaces (10), is configured to establish a wireless connection with at least one electronic device (30), is configured to verify an authorization of each of the at least one electronic

device (30), and is configured to, if an electronic device (30) is detected to be an authorized electronic device (30), log in a user associated with the electronic device (30) to a workplace (10) and adjust the user settings of the workplace (10) to the preferred user settings of the user associated with the electronic device (30).

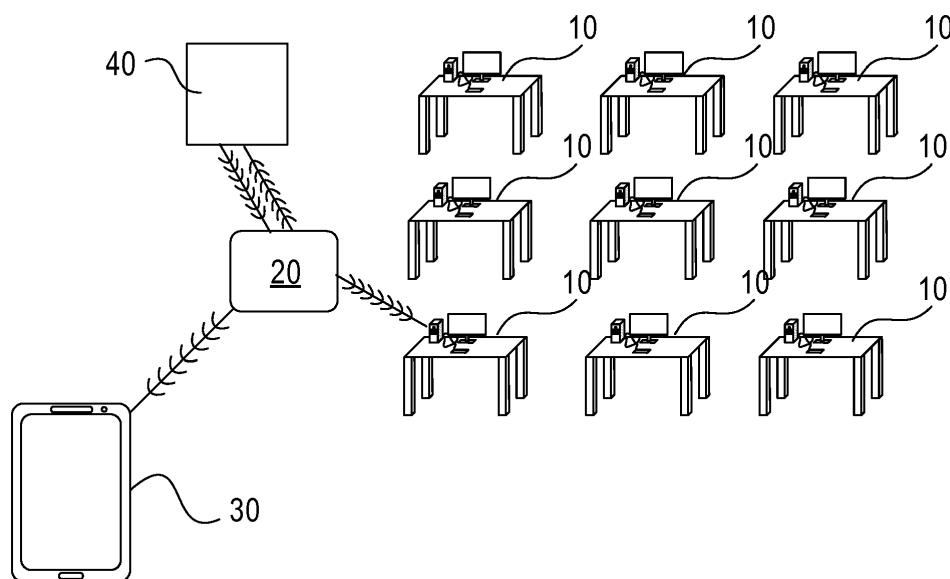


FIG 4

Description

[0001] The current invention relates to a smart desk arrangement, in particular to a smart desk arrangement in a work desk sharing environment.

[0002] Desk sharing in office space becomes more and more popular. In a work desk sharing environment or work desk sharing office space, users are allocated to an appropriate workstation each time they arrive at the office. Users do not have permanent workstations where they can leave all their working materials when they leave the office. Instead, they store away their working materials in a locker or take them home and use another workplace when they return. In this way, the overall number of workstations of a company may be reduced. Especially in larger companies, there is always a certain number of employees that is not in the office due to vacation, illness, or field work, for example. Therefore, without desk sharing, there is always a high number of workplaces that are not used. A desk sharing environment also allows smaller companies and firms to share office space with other companies and firms.

[0003] However, workplaces need to be managed, and people need to be allocated to free workplaces. When a user arrives at a new workplace, he needs to adjust certain settings such as the height of an office chair and desk, for example. This may be annoying if the settings have to be readjusted every single day.

[0004] There is a need for a user friendly smart desk arrangement that allows to easily book a workplace in a desk sharing environment.

[0005] This problem is solved by a smart desk arrangement according to claim 1, a smart desk module according to claim 9, and a method according to claim 10. Configurations and further developments of the invention are the subject of the dependent claims.

[0006] A smart desk arrangement includes a plurality of workplaces and a control device. The control device is connected to at least one of the workplaces, is configured to establish a wireless connection with at least one electronic device, is configured to verify an authorization of each of the at least one electronic device, and is configured to, if an electronic device is detected to be an authorized electronic device, log in a user associated with the electronic device to a workplace and adjust the user settings of the workplace to the preferred user settings of the user associated with the electronic device.

[0007] Such a smart desk arrangement is very user friendly and allows to easily book a workplace.

[0008] The wireless connection may be a connection according to a near field communication (NFC) standard.

[0009] The NFC standard is a widespread standard that allows to transmit data between two devices.

[0010] The control device may be further configured to assign one of the plurality of workplaces to the electronic device if the electronic device is detected to be an authorized electronic device.

[0011] In this way, the user does not need to locate a

free workplace. The workplaces are assigned automatically.

[0012] The control device may be further configured to be coupled to a central server.

5 **[0013]** The control device may be coupled to the central server via a WiFi connection.

[0014] WiFi connections are standard in most office spaces these days.

10 **[0015]** The control device may be coupled to all of the plurality of workplaces and is further configured to manage an occupancy schedule of the plurality of workplaces.

15 **[0016]** Each of the plurality of workplaces may comprise at least a desk chair, a desk, and a desk lamp, and the preferred user settings comprise at least one of a height of the desk chair, a height of the desk, and a brightness of the desk lamp.

[0017] These are the most common settings a user may change upon arrival at a new workplace.

20 **[0018]** The smart desk arrangement may further comprise a charging pad wherein, when the electronic device is placed on top of the charging pad, the electronic device is charged by the charging pad via resonant inductive coupling.

25 **[0019]** This allows the user to easily charge his electronic device while he is at his workplace.

[0020] A smart desk module is connected to at least one of a plurality of workplaces and is configured to establish a wireless connection with at least one electronic device, verify an authorization of each of the at least one electronic device, and, if an electronic device is detected to be an authorized electronic device, log in a user associated with the electronic device to a workplace and adjust the user settings of the workplace to preferred user settings of the user associated with the electronic device.

30 **[0021]** A method comprises establishing a wireless connection between a control device and at least one electronic device, verifying, by means of the control device, an authorization of each of the at least one electronic device, and, if an electronic device is detected to be an authorized electronic device, logging in a user associated with the electronic device to a workplace and adjusting the user settings of the workplace to preferred user settings of the user associated with the electronic device.

45 **[0022]** Examples are now explained with reference to the drawings. In the drawings the same reference characters denote like features.

Figure 1 schematically illustrates a workplace in communication with an electronic device.

Figure 2 schematically illustrates a workplace in communication with an electronic device and a central server.

Figure 3 schematically illustrates in a process diagram a method for operating a smart desk arrangement according to the present invention.

Figure 4 schematically illustrates a smart desk arrangement in a desk sharing environment according to the present invention.

Figure 5 exemplarily illustrates in a flow diagram a method according to the present invention.

[0023] Figure 1 schematically illustrates a workplace 10. The workplace 10 may be a workplace in an office space, for example, and comprise an office chair, a desk, a computer, a keyboard, a computer mouse, a desk lamp, etc. Several settings of the workplace 10 may be adjusted by a user. Such settings may be a height of the office chair or desk, or a brightness of the desk lamp, for example. The user may adjust all settings manually. The workplace 10 may be part of an office space. In addition to the workplace 10 illustrated in Figure 1, a plurality of further workplaces 10 may be arranged in the office space (additional workplaces 10 not illustrated in Figure 1). The office space may be a work desk sharing office. In a work desk sharing office space, users are allocated to an appropriate workplace 10 each time when they arrive at the office. Users do not have a permanent workplace 10 where they can leave all their working materials when they leave the office. Instead, they store away their working materials in a locker or take them home and, in most cases, use another workplace 10 when they return. In this way, the overall number of workplaces of an office space may be reduced. Especially in larger companies, there is always a certain number of employees that is not in the office due to vacation, illness, or field work, for example. Therefore, without desk sharing, there is always a high number of workplaces that are not used. In a desk sharing office, the number of free workplaces 10 may be significantly reduced. A desk sharing environment also allows smaller companies and firms to share office space with other companies and firms. However, regularly using another workplace 10 requires the user to frequently adjust the workplace settings.

[0024] In order to increase user friendliness, the settings of the workplace may be adjusted automatically. For example, the user may have a portable electronic device 30 which he carries with him. The portable electronic device 30 may be a smartphone, tablet computer, personal digital assistant, laptop, or anything similar, for example. Upon arrival at the workplace 10, the portable electronic device 30 may connect wirelessly with a control device (e.g., smart desk unit) 20. The control device 20 may be assigned exclusively to the workplace 10. That is, each of a plurality of workplaces 10 may have a separate control device 20, for example, as is exemplarily illustrated in Figure 1.

[0025] Once the portable electronic device 30 is connected to the control device 20, the portable electronic device 30 may be authenticated. If the portable electronic device 30 is recognized as an authorized portable electronic device 30, the user's settings may be automatically adjusted. For example, the settings for all authorized users

may be stored in the control devices 20 of an office space. It is also possible, that each user has his own settings stored on his own portable electronic device 30. The portable electronic device 30, after authentication has been successfully conducted, may transfer the settings wirelessly to the control device 20.

[0026] Once the portable electronic device 30 has been authenticated, it is further possible that a computer of the workplace is switched on automatically and the user's personal profile is loaded on the computer. That is, the user may be automatically logged into the system. The user may then have access to his personal files stored, e.g., on a central server, may access his email account and resume his work. The login process is mostly automated and, therefore, is greatly simplified for a user.

[0027] For example, the portable electronic device 30 may communicate with the control device 20 via near field communication (NFC). NFC allows for a wireless data exchange between devices over a distance of several centimeters. Up to 424 kBit/s may be exchanged when using NFC. Usually, one of the communicating devices acts as a so-called NFC reader, and the other one of the devices acts as so-called NFC tag. According to one example, the control device 20 acts as reader and the portable electronic device 30 acts as tag.

[0028] When using NFC, the data exchange is implemented using inductive coupling between two inductances (e.g., antennas). The control device 20, therefore, may comprise a first antenna, and the portable electronic device 30 may comprise a second antenna (antennas not specifically illustrated). The inductance (antenna) of the NFC-reader functions as an initiator, and the inductance (antenna) of the NFC-tag functions as target. The electromagnetic field radiates from the initiator to the target with a frequency of 13.56MHz.

[0029] A workplace 10 that is further wirelessly coupled to a central server 40 is schematically illustrated in Figure 2. As has been described above, information about user settings may be stored on the central server 40 instead of in the control device 20 or in the electronic device 30, for example.

[0030] The control device 20 may be connected to the central server 40 via a WiFi (Wireless Fidelity) connection, for example. WiFi networks are usually provided in office spaces.

[0031] Now referring to the process diagram of Figure 3, a method for operating a smart desk arrangement according to the present invention is schematically illustrated. As has been described before, the electronic device 30 may be connected to the control device 20 via an NFC-connection (or any other suitable wireless or wired connection). Data may be sent via the NFC-connection in both directions, namely from the electronic device 30 to the control device 20 and vice versa, if an active so-called peer-to-peer mode is used and the electronic device 30 acts as an active NFC transmitter. In other cases, if the portable electronic device 30 acts as a passive tag or passive NFC transmitter, the communication is unidi-

rectional. In such cases, the electronic device may be operated as an NFC tag (or target) in a so-called emulation mode. The electronic device 30 may further be logged into an office network, for example. According to one example, the electronic device 30 may be wirelessly connected to the central server 40 via a WiFi connection. The control device 20 may comprise a controller (e.g., microcontroller). The controller may be configured to perform certain tasks. For example, wireless or wired connections may be managed. Further, the controller may comprise or may be coupled to a storage device that is configured to store user information. Via a motor control module, for example, the control device 20 may control the office workplace 10 and adjust user settings such as a height of an office chair or desk.

[0032] The control device 20 may further comprise a wireless module interface WMI, which may also be referred to as wireless power charger WPC. In this way, it is possible to charge the electronic device 20 by using a Qi standard, for example. Qi is an open interface standard that defines wireless power transfer using inductive charging over distances of up to 4cm. The system generally uses a charging pad and a compatible electronic device 30, which is placed on top of the charging pad. The electronic device 30 may be charged via resonant inductive coupling. Therefore, the control device 20 may allow a user to charge his electronic device 30 by placing it on a provided charging pad. The electronic device 30 may be charged as long as the user is using the workplace 10. When the user leaves the workplace, he may be logged off and the charging of the electronic device may terminate.

[0033] As has been described above, an automatic user logon may be performed when the electronic device 30 is detected to be an authorized device assigned to a user that is known to the control device 20 and/or the central server 40.

[0034] It is further possible to share audio or telephone data between the electronic device 30, the control device 20 and/or the central server 40. In this way, the user may take part in phone conferences or video conferences using his own phone (electronic device 30).

[0035] Now referring to Figure 4, a plurality of workplaces 10 is illustrated in a shared desk environment. If the office is a comparably small office and the total number of workplaces 10 is small, a user may locate a free workplace himself. However, if the office and the overall number of workplaces 10 are large, it may be difficult and even annoying for a user to locate a free workplace 10 for himself. Even further, it may be desirable that members of a team use workplaces 10 that are located close to each other. This allows easy communication between users that are working together. On the other hand, users that do not work together at all and do not need any form of interaction may be seated far away from each other.

[0036] Therefore, the central server 40 may manage the workplaces 10 and their availability. The control de-

vice 20 in this case may not be dedicated to a single workplace 10. For example, there may be one control device 20 that is in communication with the central server 40 as well as with all of the workplaces 10 of a plurality of workplaces 10. For example, the control device 20 may be installed at the entrance to an office space or office building. Upon arrival, the user may check into the system by establishing a connection between the electronic device 30 and the control device 20. Once the electronic device 30 has been recognized and authenticated, the control device 20 may communicate with the central server 40. The control device 20 or the central server 40 may assign a workplace 10 to the user.

[0037] In the simplest case, the central server 40 may assign the next free workplace 10 to the user. That is, the workplaces 10 may simply be filled sequentially in the order of arrival of the users. However, as has been explained above, according to another example, the control device 20 or the central server 40 may assign the workplaces 10 according to one or more additional criteria. For example, the control device 20 or the central server 40 may check whether there is already another user of the same team assigned to a workplace 10. The control device 20 or the central server 40 may then assign a workplace 10 to a newly arrived user that is close to the workplace 10 of a user of the same team that has already checked in before. For example, if several different companies or firms share an office space, employees of the same company and firm may be preferably seated close to each other. Any other criteria may be defined for assigning the workplaces 10.

[0038] When a workplace 10 has been assigned to the user, the user may be automatically logged in at the respective workplace 10. For example, the login process may be performed while the user is on his way to the workplace. Upon arrival at the workplace 10, the user may begin his work without any delays. It may be necessary to enter a password upon arrival at the workplace 10. However, as the user's electronic device 30 may be unmistakably identified and authorized automatically, entering a password at the workplace 10 may not be necessary. For example, an electronic key may be stored on the electronic device 30. When checking into the system, the electronic key may be verified by the control device 20. If the electronic key is identified as a valid electronic key, and the electronic device 30 is detected to be the electronic device of an authorized user, no further password entry may be necessary. According to another example, a user may be requested to input a password via the electronic device 30.

[0039] According to one example, an application (app) may be installed on the electronic device 30. The user may input or adjust preferred settings of his workplace via such an application, for example. The user may further be required to insert a password via the application, if a password is required for a logon procedure, for example. The application generally may be password protected. That is, when the user opens the application on

his electronic device, he may be required to insert a password. Only then may he be allowed to insert or adjust his preferred workplace settings. The application may have access to any photos or videos stored on the electronic device 30. Further, the application may have access to personal contacts stored on the electronic device 30 or to a location determination function (e.g., GPS module) installed on the electronic device 30.

[0040] It is further possible that the user books his workplace 10 via such an application. For example, the user may open the application the day before he needs the workplace 10 and reserve a workplace in advance before he even reaches the office. It is also possible that the user reserves a specific preferred workplace, if this workplace is available at the desired time.

[0041] It may further be possible that the user is charged for his booking. That may be the case, for example, if a self-employed person books a workplace in a shared workplace environment. Some shared workplace environments or offices may offer a very extensive office equipment and external users may want to book a workplace now and then to use this equipment instead of working from home or from their own office. Charging the user for using the workplace is very easy when using the above described arrangement. As soon as the electronic device 30 logs in to the system and establishes a connection with the control device 20, the user may be charged. Once he logged off, he may no longer be charged.

[0042] Now referring to the flow diagram in Figure 5, a method according to one example is illustrated. In a first step, a wireless connection between a control device 20 and at least one electronic device 30 is established (step 501). In a following step, an authorization of each of the at least one electronic device 30 is verified by means of the control device 20 (step 502). If an electronic device 30 is detected to be an authorized electronic device 30, a user associated with the electronic device 30 is logged in to a workplace 30 and the user settings of the workplace 10 are adjusted to preferred user settings of the user associated with the electronic device 30 (step 503).

List of reference signs

[0043]

10 workplace
20 control device
30 electronic device
40 central server

Claims

1. A smart desk arrangement comprises a plurality of workplaces (10) and a control device (20), wherein the control device (20) is connected to at least one of the workplaces (10);

is configured to establish a wireless connection with at least one electronic device (30):

is configured to verify an authorization of each of the at least one electronic device (30); and is configured to, if an electronic device (30) is detected to be an authorized electronic device (30), log in a user associated with the electronic device (30) to a workplace (10) and adjust the user settings of the workplace (10) to the preferred user settings of the user associated with the electronic device (30).

2. The smart desk arrangement of claim 1, wherein the wireless connection is a connection according to a near field communication (NFC) standard.
3. The smart desk arrangement of claim 1 or 2, wherein the control device (20) is further configured to assign one of the plurality of workplaces (10) to the electronic device (30) if the electronic device (30) is detected to be an authorized electronic device (30).
4. The smart desk arrangement of any of claims 1, 2 or 3, wherein the control device (20) is further configured to be coupled to a central server (40).
5. The smart desk arrangement according to claim 4, wherein the control device (20) is coupled to the central server (40) via a WiFi connection.
6. The smart desk arrangement of any of claims 1 to 5, wherein the control device (20) is coupled to all of the plurality of workplaces (10) and is further configured to manage an occupancy schedule of the plurality of workplaces (10).
7. The smart desk arrangement of any of the preceding claims, wherein each of the plurality of workplaces (10) comprises at least a desk chair, a desk, and a desk lamp; and the preferred user settings comprise at least one of a height of the desk chair, a height of the desk, and a brightness of the desk lamp.
8. The smart desk arrangement of any of the preceding claims, further comprising a charging pad wherein, when the electronic device (30) is placed on top of the charging pad, the electronic device (30) is charged by the charging pad via resonant inductive coupling.
9. A smart desk module (20) that is connected to at least one of a plurality of workplaces (10) and that is configured to establish a wireless connection with at least one electronic device (30):

verify an authorization of each of the at least one electronic device (30); and
if an electronic device (30) is detected to be an authorized electronic device (30), log in a user associated with the electronic device (30) to a workplace (30) and adjust the user settings of the workplace (10) to preferred user settings of the user associated with the electronic device (30).

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10. A method comprising:

establishing a wireless connection between a control device (20) and at least one electronic device (30);
verifying, by means of the control device (20), an authorization of each of the at least one electronic device (30); and
if an electronic device (30) is detected to be an authorized electronic device (30), logging in a user associated with the electronic device (30) to a workplace (30) and adjusting the user settings of the workplace (10) to preferred user settings of the user associated with the electronic device (30).

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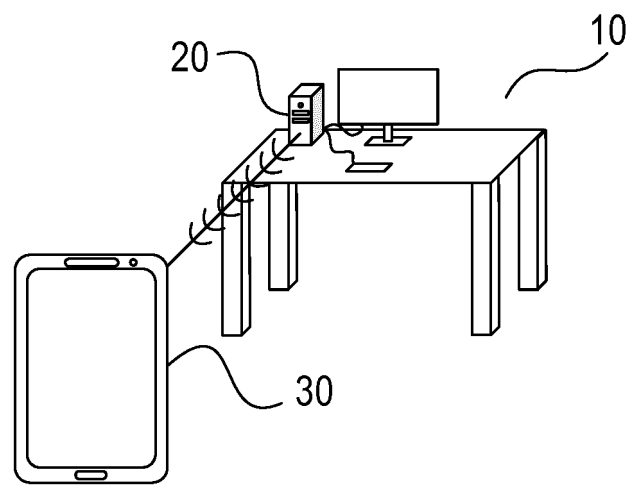


FIG 1

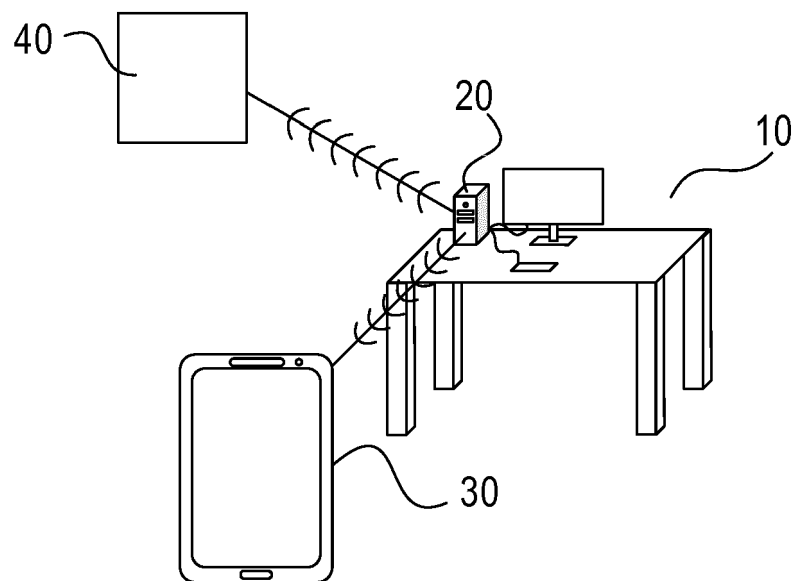


FIG 2

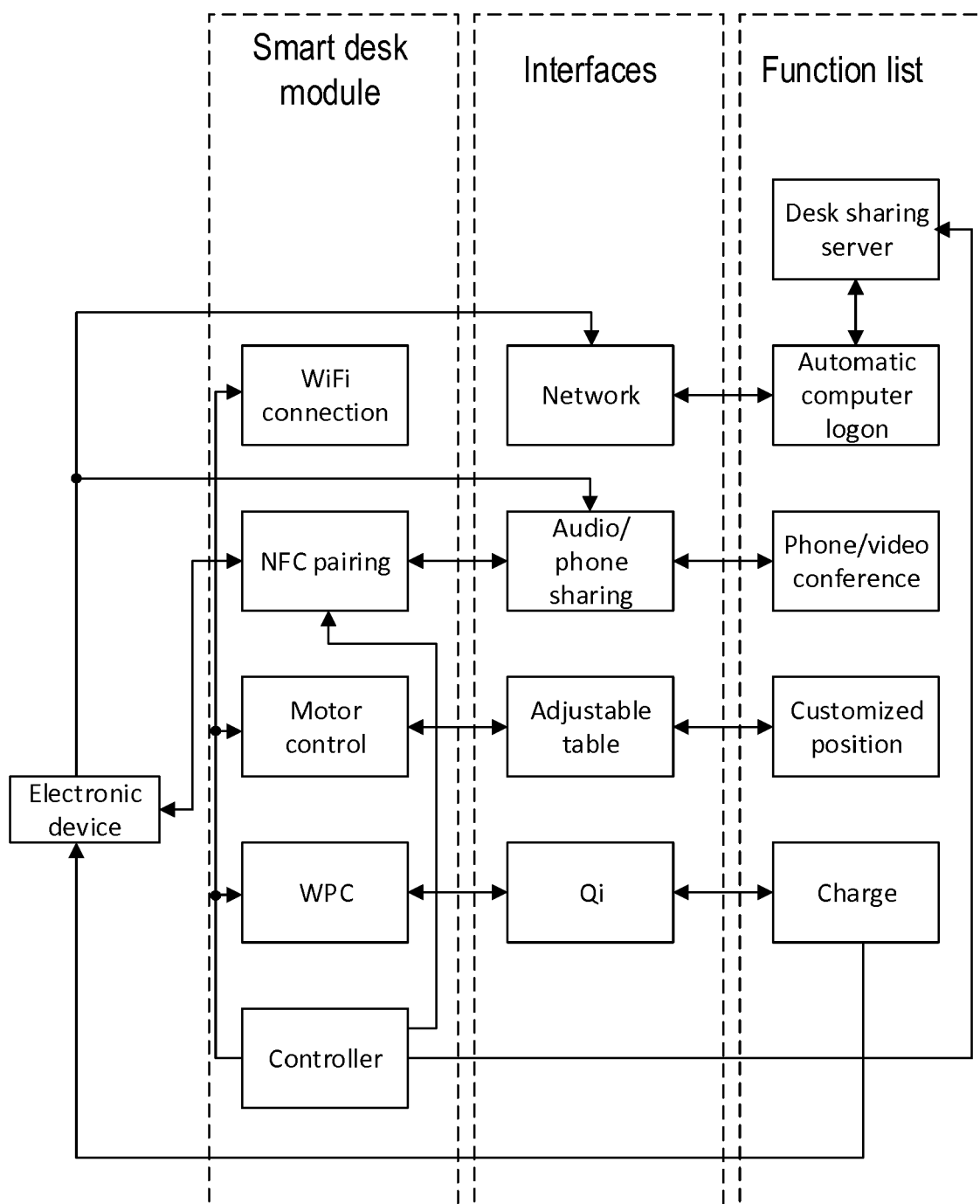


FIG 3

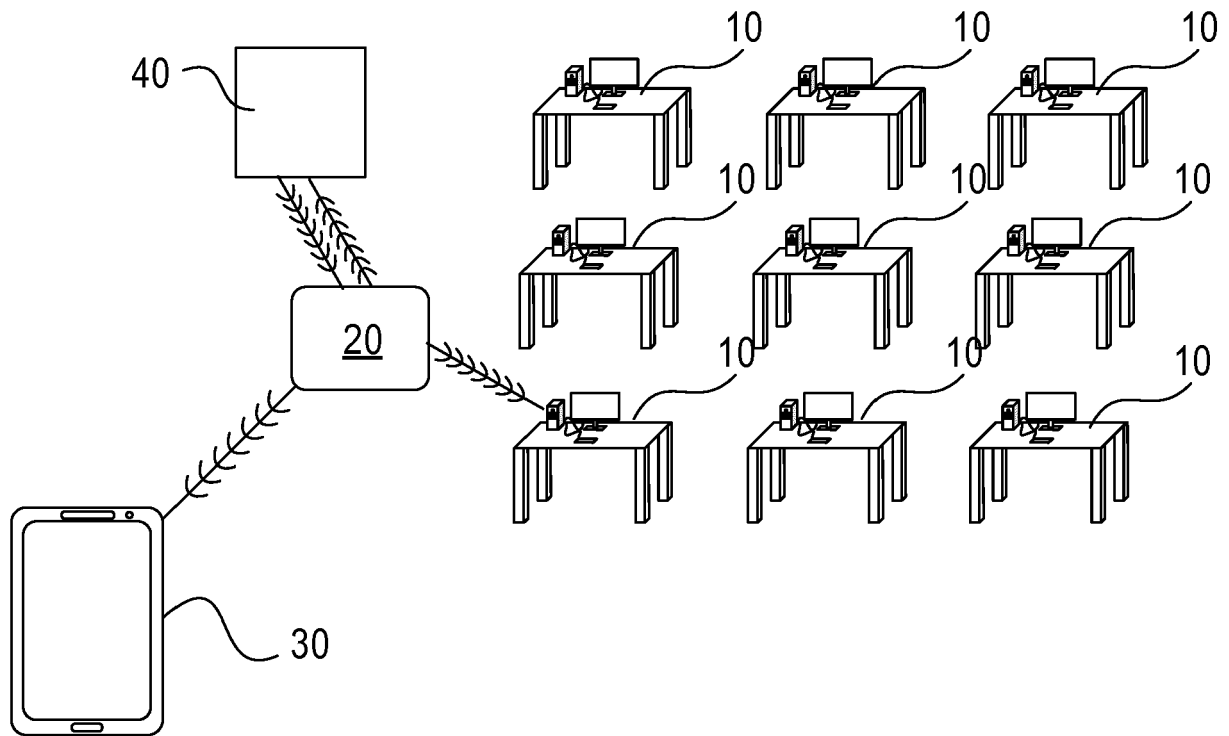


FIG 4

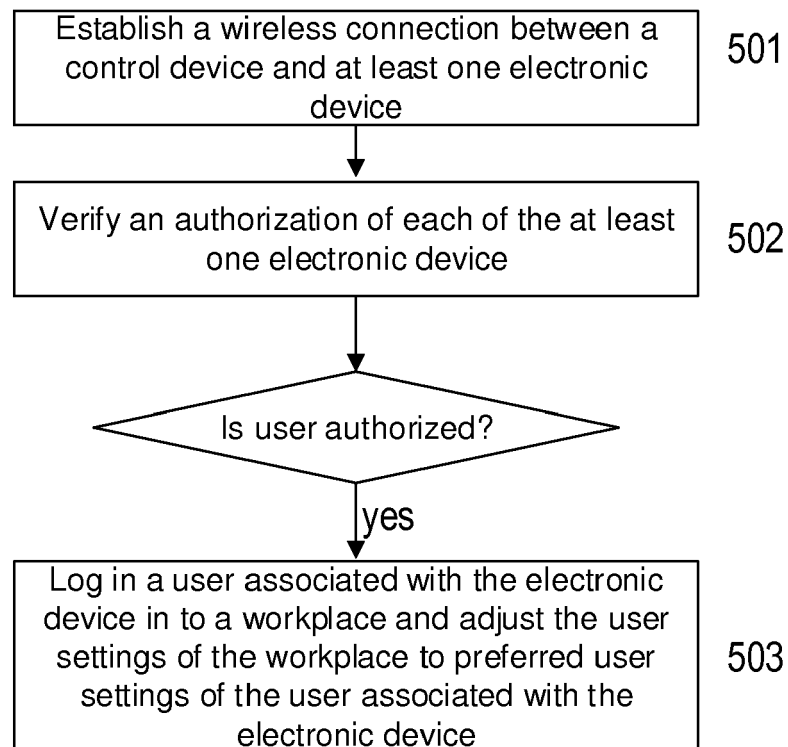


FIG 5



EUROPEAN SEARCH REPORT

Application Number
EP 19 46 5570

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 April 2020	Examiner Weidmann, Matthias
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 19 46 5570

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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06-04-2020

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