



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**04.01.2017 Bulletin 2017/01**

(51) Int Cl.:  
**G08C 17/00 (2006.01) H05B 37/02 (2006.01)**

(21) Application number: **15306052.0**

(22) Date of filing: **30.06.2015**

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

(72) Inventors:  
• **RIERA, Julien**  
**92130 Issy Les Moulineaux (FR)**  
• **ROTH, Lukasz**  
**43-300 Bielsko-Biala (PL)**

(74) Representative: **Cabinet Plasseraud**  
**66 rue de la Chaussée d'Antin**  
**75440 Paris Cedex 09 (FR)**

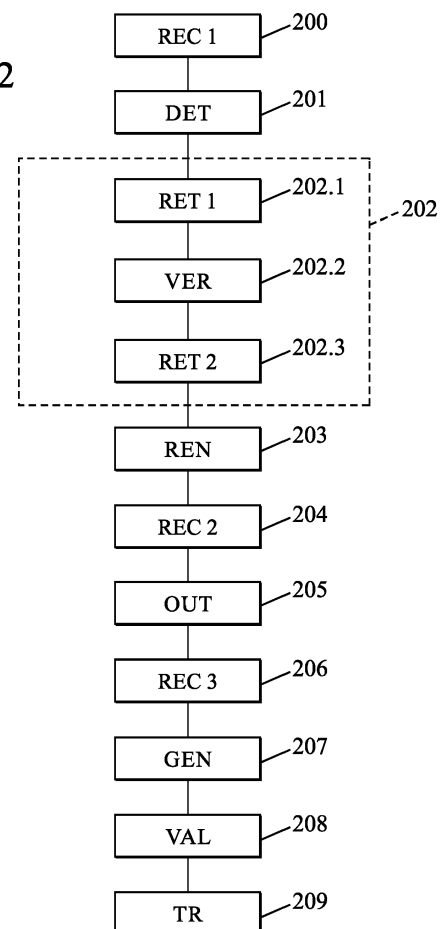
(71) Applicant: **Orange**  
**75015 Paris (FR)**

(54) **ENRICHED INSTRUCTIONS FOR REMOTELY CONTROLLING ELECTRONIC DEVICES**

(57) The invention relates to a method for managing a remote electronic device using a user interface on an electronic device, the electronic device being operatively connected to a database storing each device identifier value in association with a list of alternative function identifier values, and storing associations between a function and a list of alternative parameter identifier values, the method comprising:

- determining (201) a first device identifier value and a first function identifier value based on a first user input;
- retrieving (202) in the database a first list of alternative parameter identifier values based on the first device identifier value and the first function identifier value;
- rendering (203) the first user input with the retrieved list of alternative parameter identifier values;
- upon reception (206) of a second user input for selecting a first alternative parameter identifier value of the list, generating (207) an instruction based on the first device identifier value, the first function identifier value and the first parameter identifier value.

**FIG. 2**



## Description

[0001] The present invention generally relates to the control of remote electronic devices, such as connected objects for example.

[0002] It finds applications in electronic devices such as laptops, touchpads, mobile phones, Smartphones, wearable devices or smart watches.

[0003] In what follows, we consider, for illustrative purpose exclusively, electronic devices as mobile phones and remote electronic devices as connected objects.

[0004] Connected objects can be remotely controlled by mobile phones, for example by means of an application installed in the mobile phones providing a user interface.

[0005] It is meant by "*connected object*" any object able to perform a given function, according to optional parameters, and comprising a network interface to access an access point, thereby accessing a remote server (through a network such as the internet for example or a local Bluetooth network), or to receive commands from a mobile phone (or any electronic device).

[0006] For example, a connected coffee machine can perform basic functions such as "*switch on*" and "*switch off*". However, "*switch on*" can encompass several functions such as "*prepare a latte coffee*", "*prepare an espresso*", "*prepare a cappuccino*". In addition, each device and function can also be associated with parameters. For example, the parameters can be a volume of the coffee to be prepared. The parameters may therefore comprise "*2 centilitres*", "*5 centilitres*", etc.

[0007] Electronic devices such as mobile phones that are used to remotely control connected objects now provide several ways to receive a user input and to turn it into an instruction for a remote connected object: touch display, keypad, microphone coupled with a speech-to-text application, etc.

[0008] The user therefore needs to indicate information that enables the mobile phone to generate an instruction for the remote connected object.

[0009] Such information can be communicated using complementary arguments of different types:

- a device identifier to identify the connected object to be controlled or the group of connected objects to be controlled;
- a function identifier to identify the function to be performed by the identified connected object;
- optionally, a parameter identifier identifying a parameter of the identified function to be performed by the identified connected object.

[0010] To indicate this information, argument values can be included in a user input such as a sentence "*could you switch-on the bedroom light in blue*". This sentence comprises three arguments, of different types: a device identifier having the value "*bedroom light*", a function identifier having the value "*switch-on*" and a parameter

identifier having the value "*blue*".

[0011] Therefore, to generate an instruction, the user needs to identify both the device and the function to be performed by the device. This requires the user to remember which functions can be performed by a given device. This is even more critical when several parameters are associated with each function. To generate an enriched instruction, the user has to remember all the parameters of all the functions of each device.

[0012] As users tend to own more and more connected objects, there is a need to enrich instructions to remotely control these objects without requesting the user to learn all the alternative arguments of a given connected object.

[0013] To address this need, a first aspect of the invention concerns a method for managing a remote electronic device using a user interface on an electronic device, the electronic device being operatively connected to a database of remote electronic devices identified by device identifier values, the database storing each device identifier value in association with a list of alternative function identifier values identifying functions, and storing associations between a function and a list of alternative parameter identifier values, the method comprising:

- receiving a first user input on the user interface of the electronic device;
- determining a first device identifier value and a first function identifier value based on the first user input;
- retrieving in the database a first list of alternative parameter identifier values based on the first device identifier value and the first function identifier value;
- rendering the first user input with the retrieved list of alternative parameter identifier values;
- upon reception of a second user input for selecting a first alternative parameter identifier value of the list, generating an instruction based on the first device identifier value, the first function identifier value and the first parameter identifier value.

[0014] The first device identifier value may identify one or several remote electronic devices.

[0015] By retrieving the alternative parameter identifier values, the instruction can be enriched without the need for the user to remember all the parameters of a function of a given device.

[0016] According to some embodiments, rendering the first input may comprise:

- outputting a selectable graphical element;
- upon reception of a third user input for selecting said selectable graphical element, outputting the retrieved list of alternative parameter values.

**[0017]** Then, this enables rendering the selection of an alternative parameter value optional. For example, in some cases, inputting a parameter value is not mandatory to generate an instruction (for example because a default parameter value can be used). In addition, this reduces the quantity of data outputted on the electronic device.

**[0018]** According to some embodiments, the step of retrieving may comprise:

- retrieving a first list of alternative function identifier values associated with the first device identifier value;
- verifying that the first function identifier value matches at least one function identifier value of the retrieved first list of alternative function identifier values;
- in case of positive verification, retrieving the first list of alternative parameter values associated with the function identified by the first function identifier value.

**[0019]** This ensures that the identified function is compatible with the identified device before retrieving the list of alternative parameter values.

**[0020]** According to some embodiments, the method may further comprise remotely controlling the remote electronic device using the generated instruction, the remote electronic device being identified by the first device identifier value.

**[0021]** In complement, remotely controlling the remote electronic device may comprise sending the generated instruction to the remote electronic device.

**[0022]** In complement, the generated instruction can be sent to the remote electronic device upon validation by the user on the user interface.

**[0023]** This enables to avoid erroneous manipulations by the user.

**[0024]** According to some embodiments, the database may further store a compatibility mesh between the alternative parameter identifier value of each function and contextual data, the method further comprises receiving contextual data with the first user input, the first list of alternative parameter values is filtered using the compatibility mesh and the received contextual data and the filtered first list is rendered with the retrieved first list.

**[0025]** It is meant by "*compatibility mesh*", any data structure that links elements that are compatible together. Based on a given element, it is possible to retrieve all the other elements that are linked to this given element in the compatibility mesh.

**[0026]** This enables to provide only relevant alternative parameter argument values to the user.

**[0027]** The contextual data may comprise at least one among:

- location data of the user;

- weather forecast data;

- temperature data;

5 - clock data; or

- other information acquired by a sensor, retrieved from an external entity, communicated by the user or retrieved from a user profile.

10

**[0028]** A second aspect of the invention concerns a computer program product recorded on a storage medium and executable by a computer in the form of a software including at least one software module setup to implement the method according to the first aspect of the invention.

**[0029]** A third aspect of the invention concerns an electronic device for managing a remote electronic device using a user interface, the electronic device being operatively connected to a database of remote electronic devices identified by device identifier values, the database storing each device identifier value with a list of alternative function identifier values identifying functions, and storing each function in association with a list of alternative parameter identifier values.

25

**[0030]** The user interface is arranged for receiving a first user input on the user interface of the electronic device, the electronic device further comprises a processor arranged for

30

- determining a first device identifier value and a first function identifier value based on the first user input;

- retrieving in the database a first list of alternative parameter values based on the first device identifier value and the first function identifier value;

35

- rendering the first user input with the retrieved list of alternative parameter values;

40

- upon reception of a second user input for selecting a first alternative parameter value of the list via the user interface, generating an instruction based on the first device identifier value, the first function identifier value and the first parameter identifier value.

45

**[0031]** A fourth aspect of the invention concerns a system comprising an electronic device according to the third aspect of the invention and a database, said database storing each device identifier value with a list of alternative function identifier values identifying functions, and storing each function in association with a list of alternative parameter identifier values.

**[0032]** The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings, in which like reference numerals refer to similar elements and in which:

55

- Figure 1 represents a system according to some embodiments of the invention;
- Figure 2 is a flowchart illustrating the steps of a method according to some embodiments of the invention;
- Figures 3a to 3d illustrate a graphical user interface of a user terminal according to some embodiments of the invention;
- Figure 4 illustrates a user terminal according to some embodiments of the invention.

**[0033]** Figure 1 illustrates a system according to some embodiments of the invention.

**[0034]** The system comprises an electronic device 1 such as a user terminal. As illustrated on Figure 1, the electronic device 1 can be a mobile phone such as a Smartphone. The invention is not limited to this illustrative example, and also encompasses touch pads, laptops, desktop computers, etc.

**[0035]** The electronic device 1 can be used by the user to control remote electronic devices such as connected objects. In what follows, "*remote electronic devices*" are called "*connected objects*", for illustrative purposes.

**[0036]** The user of the electronic device 1 (also called "*user terminal 1*" hereafter) may have several connected objects located in different places :

- a connected coffee machine 10.1 located at home;
- a bedroom light 10.2 located at home;
- a kitchen light 10.3 located at home;
- a car light 10.4 located in a car.

**[0037]** Connected objects 10.1-10.3 are configured to access to a first access point 11.1 and connected object 10.4 is configured to access to a second access point 11.2. No restriction is attached to the access technology used by the connected objects: wired or wireless means can be envisaged. In what follows, we consider the first and second access points as being Wi-fi access points.

**[0038]** Through the access points 11.1 and 11.2, the connected objects can access a network 12, such as the internet, and communicate with a remote service platform 14, for example to upload events or to receive instructions. Alternatively, the network 12 can be a local Bluetooth network and the remote service platform 14 can be replaced by a local management entity. Several respective service platforms can also be envisaged for the different connected objects 10.1 to 10.4, and a unique service platform 14 has been represented for illustrative purposes exclusively.

**[0039]** The service platform 14 can also be accessed by the user terminal 1. For example, the user terminal can connect the access point 11.1 when the user is at home. Alternatively, the user may use a 3G/4G mobile network to access the service platform 14 with the user terminal 1.

**[0040]** An application dedicated to the service platform 14 can be installed on the user terminal 1. Through this application, the user may enter user inputs that are converted to instructions. The instructions can then be used to control the connected objects 10.1-10.4. To this end, the instructions may be forwarded to the service platform 14, which then forwards (and optionally modifies or enriches) the instructions to the targeted connected objects 10.1-10.4.

**[0041]** The user terminal 1 is also operatively connected to a database 13 of remote electronic devices identified by device identifier values. On figure 1, the database 13 can be accessed through the network 12. Alternatively, the database 13 can be stored in the user terminal 1 or can be integrated in the service platform 14.

**[0042]** The database 13 may store each device identifier value in association with a list of alternative function identifier values identifying functions, and storing associations between a function and a list of alternative parameter identifier values.

**[0043]** For example, the bedroom light 10.2 may be associated with the function identifier values "*switch off*" and "*switch on*". In addition, the function "*switch on*" may be stored association with a list of alternative parameter values comprising possible light colours, such as "*red*", "*yellow*", "*blue*", "*green*".

**[0044]** However, such parameter identifier values may be optional, or may be not available. For example, the kitchen light 10.2 may be associated with the same function identifier values "*switch off*" and "*switch on*", but no parameter identifier value may be associated to the "*switch on*" function (because the kitchen light is not able to provide light using different colours for example, or because a default parameter value, white for example, has been pre-set).

**[0045]** As already explained in the introductory part of the description, the coffee machine 10.1 may be associated with the function identifier values "*switch off*", "*prepare a latte coffee*", "*prepare an espresso*", "*prepare a cappuccino*". In addition, the functions "*prepare a latte coffee*", "*prepare an espresso*", "*prepare a cappuccino*" can also be associated with parameters such as "*2 centilitres*", "*5 centilitres*", etc.

**[0046]** In the techniques according to the prior art, the user has to remember all the possible combinations between devices, functions and parameters, which is almost impossible when several objects are owned by the user.

**[0047]** The database 13 may also store a compatibility mesh between the alternative parameter identifier values and contextual data.

**[0048]** By further providing contextual data, the alternative parameter values can be filtered using the compatibility mesh. No restriction is attached to the format of the compatibility mesh. It is meant by "*compatibility mesh*" any data structure that links elements that are compatible together. Based on a given element, it is possible to retrieve all the other elements that are linked to

this given element in the compatibility mesh.

**[0049]** Contextual data may comprise location data of the user, weather forecast data, temperature data, clock data or any other information acquired by a sensor of the user terminal 1, retrieved from an external entity, communicated by the user or retrieved from a user profile.

**[0050]** No restriction is attached to the format of the compatibility mesh. Such a compatibility mesh can be configured by the user, for example using the user terminal 1 or any device that is adapted to access the database 13. For example, the user may configure that in the morning, he prefers a long coffee (5 centilitres or more), and therefore, if the user requests to prepare a cappuccino and that contextual data (clock data) indicates that the current time is in the morning, the alternative parameter identifier values associated with the function "prepare a cappuccino" are filtered to only provide alternative parameter identifier values being more than 5 centilitres.

**[0051]** Alternatively, the compatibility mesh can be configurable by another person than the user (for example a parent in case where the user is a child, or any person being entitled to manage the compatibility mesh of the user). The compatibility mesh may also be configurable by a manufacturer of some of the connected objects, or by the service platform 14.

**[0052]** The system illustrated on figure 1 is only provided for illustrative purposes. For example, the network used to control the connected objects 10.1-10.4 can be a local access network, such as a Bluetooth network for example, and, in that case, there is no need to access to a remote service platform.

**[0053]** Figure 2 is a flowchart illustrating the steps of a method according to some embodiments of the invention.

**[0054]** At step 200, the user interface of the user terminal 1 receives a first user input. No restriction is attached to the first user input, which can be a pronounced sentence acquired by a microphone and converted to text, or a character string input using a touch pad or a keyboard. At step 200, the user terminal 201 may also receive contextual data. No restriction is attached to what is meant by contextual data. The contextual data may comprise at least one element among :

- location of the user acquired by a sensor, acquired for example through a GPS of the user terminal, or acquired using the location of the access point to which the user terminal 1 accesses the network 12;
- weather forecast data acquired via an application installed on the user terminal 1 for example; or
- temperature data acquired by a sensor of the user terminal 1, or acquired via the network 12; or
- clock data indicating the time at which the user input is received. Clock data can be retrieved from a clock application of the user terminal 1 for example; or

- other contextual data acquired by a sensor, retrieved from an external entity, input by the user in the user input or retrieved from a user profile.

**[0055]** At step 201, a first device identifier value and a first function identifier value are determined based on the first input. For example, the first user input comprises the first device identifier value and the first function identifier value. Alternatively, the first user input comprises only one among the first device identifier value and the first function identifier, the other one being implicitly deduced. For example, if the first user input comprises the function identifier value "prepare a cappuccino", and that the user owns only one coffee machine, the device identifier value "coffee machine" can be deduced. Reciprocally, if the first user input is "kitchen light", which only comprises the first device identifier value, it can be deduced from the fact that the kitchen light 10.3 is currently off, that the function identifier value is "switch on".

**[0056]** At step 202, a first list of alternative parameter values is retrieved from the database 13 based on the first device identifier value and the first function identifier value.

**[0057]** For example, step 202 may comprise the following sub-steps:

- retrieving at step 202.1 a first list of alternative function identifier values associated with the first device identifier value;
- verifying at step 202.2 that the first function identifier value matches at least one function identifier value of the retrieved first list of alternative function identifier values;
- in case of positive verification, retrieving at step 202.3 the first list of alternative parameter values associated with the function identified by the first function identifier value; and
- in case of negative verification, then the identified function is not compatible with the identified device and an error message may be outputted.

**[0058]** At steps 203 to 205, the first user input is rendered with the retrieved first list of alternative parameter values.

**[0059]** According to a first embodiment, the first list of alternative parameter values is directly displayed at step 205 without being requested by the user. This enables to force the user to input a required parameter value, without the need for the user to remember all the alternative parameter values. Indeed, in some cases, inputting a parameter value may be mandatory to render the instruction performable by a connected object. A second input from the user can then be received at step 206 for selecting a first alternative parameter value among the alternative parameter values of the first list.

**[0060]** Alternatively, according to a second embodiment, at step 203 a selectable graphical element is outputted. To this end, the first user input can be displayed on a display of the user terminal with a selectable window, as it will be further explained when referring to figures 3a to 3d.

**[0061]** Then, at step 204, a third user input can be received on the user interface of the user terminal 1, the third user input being for selecting the selectable graphical element. As for the first user input, no restriction is attached to the third user input. The first second input may be a click or double click on a press button or on a touch display for example.

**[0062]** Upon receiving of the third user input at step 204, the retrieved list of alternative parameter identifier values is outputted on the user terminal 1 at step 205. Each of the alternative parameter identifier values of the list is selectable by the user.

**[0063]** Then, as already explained, at step 206, the second user input is received on the user interface of the user terminal 1, the second user input being for selecting a first alternative parameter identifier value in the outputted list. Again, no restriction is attached to the second user input.

**[0064]** Upon receiving of the second user input at step 205, an instruction is generated at step 206 based on the first device identifier value, the first function identifier value and the first parameter identifier value.

**[0065]** The generated instruction can be optionally validated at step 206 by the user at step 208 (for example by receiving a fourth user input on a validation window or on a validation press button of the user terminal 1).

**[0066]** At step 207, at least one of the connected objects 10.1-10.4 is remotely controlled using the generated instruction, the controlled connected object being identified by the first device identifier value.

**[0067]** Figures 3a to 3d illustrate a user interface on the user terminal 1, according to some embodiments of the invention.

**[0068]** As illustrated on figure 3a, a first user input 300 can be received by the user terminal 1 and outputted on a display, such as a touch display (user interface). The first user input exemplified on figure 3a comprises the first function identifier value "switch on" 301.1 and the first device identifier value "bedroom light" 301.2.

**[0069]** As previously explained, the "switch on" function of the bedroom light 10.2 is associated with colours that represent alternative parameter identifier values. A first list of these alternative parameter identifier values can be retrieved from the database 13.

**[0070]** A selectable graphical element 303 is outputted on the touch display at step 205, as illustrated on figure 3b. In addition, an optional validation window 302 can also be outputted at step 205. In case the user validates the user input 300, an instruction can be sent to the bedroom light 10.2 : although no parameter identifier value has been specified by the user, a default value (yellow for example) or a former parameter identifier value used

in the last instruction may be used to remotely control the bedroom light 10.2. However, in cases where specifying a parameter identifier value is mandatory, the validation window 302 is not displayed at step 205.

**[0071]** Upon reception of the third user input on the selectable graphical element 303, a window 304 (according to the optional second embodiment described above) is displayed on the user terminal 1, the window 304 outputting the first list of alternative parameter identifier values. The first list comprises :

- the alternative parameter identifier value "red" 305.1;
- the alternative parameter identifier value "yellow" 305.2;
- the alternative parameter identifier value "blue" 305.3 and
- the alternative parameter identifier value "green" 305.4.

**[0072]** Upon reception of the second user input, to select the alternative parameter identifier value "yellow" 305.2 for example, an instruction is generated at step 207, the alternative parameter identifier value "yellow" 305.2 being displayed as an argument 301.3 of the instruction. A validation window 302 can again be optionally displayed at step 207, and upon reception of a fourth user input on the validation window 302, the generated instruction is used to remotely control the bedroom light 10.2.

**[0073]** No restriction is attached to the way the remote connected object is controlled : for example, the new instruction can be transmitted to the service platform 14 and the service platform 14 then forwards (and optionally modifies or enriches) it to the remote controlled connected object.

**[0074]** Figure 4 shows an electronic device 1 (or user terminal 1) according to some embodiments of the invention.

**[0075]** The user terminal 1 comprises a random access memory 403 and a processor 402 that can store instructions for performing the steps of a method as described above when referring to figure 2.

**[0076]** The user terminal 1 may also comprise a database 404 for storing data resulting from the method according to the invention. For example, the database 404 may store the data that are retrieved from the database 13 (device identifier values in association with lists of alternative function identifier values and associations between a function and a list of alternative parameter identifier values, compatibility mesh) and can store user identifiers. According to an embodiment, the database 13 can be stored in the user terminal, in database 404.

**[0077]** The user terminal 1 comprises a user interface 401 for receiving selections and user inputs by the user. The user interface 401 can for example comprise a touch display, a virtual or physical keyboard, press buttons, a camera and/or a microphone coupled to a speech-to-text application. The user terminal 1 also comprises a network

interface 405 to communicate with the network 12 and in particular to transmit the user entries to the selected connected objects. The network interface can be a wired interface (Ethernet) or wireless (Bluetooth, 2G, 3G, 4G, Wi-fi, etc).

## Claims

1. A method for managing a remote electronic device (10.1-10.4) using a user interface (401) on an electronic device (1), the electronic device being operatively connected to a database (13) of remote electronic devices identified by device identifier values, said database storing each device identifier value in association with a list of alternative function identifier values identifying functions, and storing associations between a function and a list of alternative parameter identifier values, the method comprising:

- receiving (200) a first user input on the user interface of the electronic device;
- determining (201) a first device identifier value and a first function identifier value based on the first user input;
- retrieving (202) in the database a first list of alternative parameter identifier values based on the first device identifier value and the first function identifier value;
- rendering (203) the first user input with the retrieved list of alternative parameter identifier values;
- upon reception (206) of a second user input for selecting a first alternative parameter identifier value of the list, generating (207) an instruction based on the first device identifier value, the first function identifier value and the first parameter identifier value.

2. The method according to claim 1, wherein rendering the first input comprises:

- outputting a selectable graphical element;
- upon reception of a third user input for selecting said selectable graphical element, outputting the retrieved list of alternative parameter values.

3. The method according to claim 1 or 2, wherein the step of retrieving comprises:

- retrieving (202.1) a first list of alternative function identifier values associated with the first device identifier value;
- verifying (202.2) that the first function identifier value matches at least one function identifier value of the retrieved first list of alternative function identifier values;
- in case of positive verification, retrieving

(202.3) the first list of alternative parameter values associated with the function identified by the first function identifier value.

4. The method according to one of the preceding claims, wherein the method further comprises remotely controlling (209) the remote electronic device using the generated instruction, said remote electronic device being identified by the first device identifier value.

5. The method according to claim 4, wherein remotely controlling the remote electronic device comprises sending the generated instruction to the remote electronic device.

6. The method according to claim 5, wherein, the generated instruction is sent to the remote electronic device upon validation (208) by the user on the user interface.

7. The method according to one of the preceding claims, wherein the database (13) further stores a compatibility mesh between the alternative parameter identifier value of each function and contextual data; wherein the method further comprises receiving contextual data with the first user input; wherein the first list of alternative parameter values is filtered using the compatibility mesh and the received contextual data; and wherein the filtered first list is rendered with the first user input.

8. The method according to claim 7, wherein the contextual data comprises at least one among:

- location data of the user;
- weather forecast data;
- temperature data;
- clock data; or
- other information acquired by a sensor, retrieved from an external entity or communicated by the user or retrieved from a user profile.

9. A computer program product recorded on a storage medium and executable by a computer in the form of a software including at least one software module setup to implement the method according to any of claims 1 to 8.

10. An electronic device for managing a remote electronic device (10.1-10.4) using a user interface (401), the electronic device being operatively connected to a database (13) of remote electronic devices identified by device identifier values, said database storing each device identifier value with a list of alternative function identifier values identifying functions, and

storing each function in association with a list of alternative parameter identifier values:

wherein the user interface is arranged for receiving a first user input on the user interface of the electronic device; 5

wherein the electronic device further comprises a processor (402) arranged for

- determining a first device identifier value and a first function identifier value based on the first user input; 10

- retrieving in the database a first list of alternative parameter values based on the first device identifier value and the first function identifier value; 15

- rendering the first user input with the retrieved list of alternative parameter values;

- upon reception of a second user input for selecting a first alternative parameter value of the list via the user interface, generating an instruction based on the first device identifier value, the first function identifier value and the first parameter identifier value. 20

25

11. A system comprising an electronic device (1) according to claim 10 and a database (13), said database storing each device identifier value with a list of alternative function identifier values identifying functions, and storing each function in association with a list of alternative parameter identifier values. 30

35

40

45

50

55

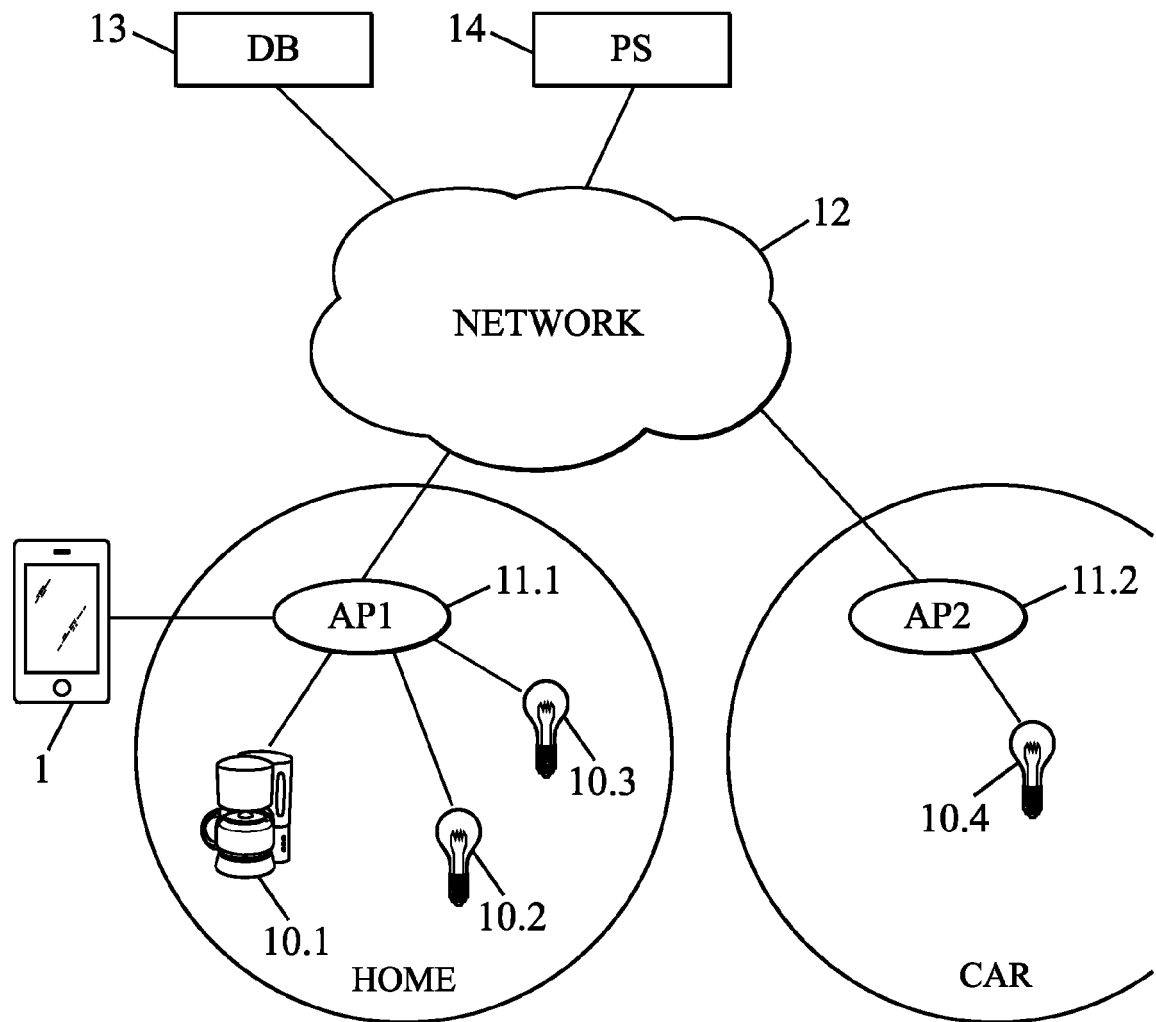
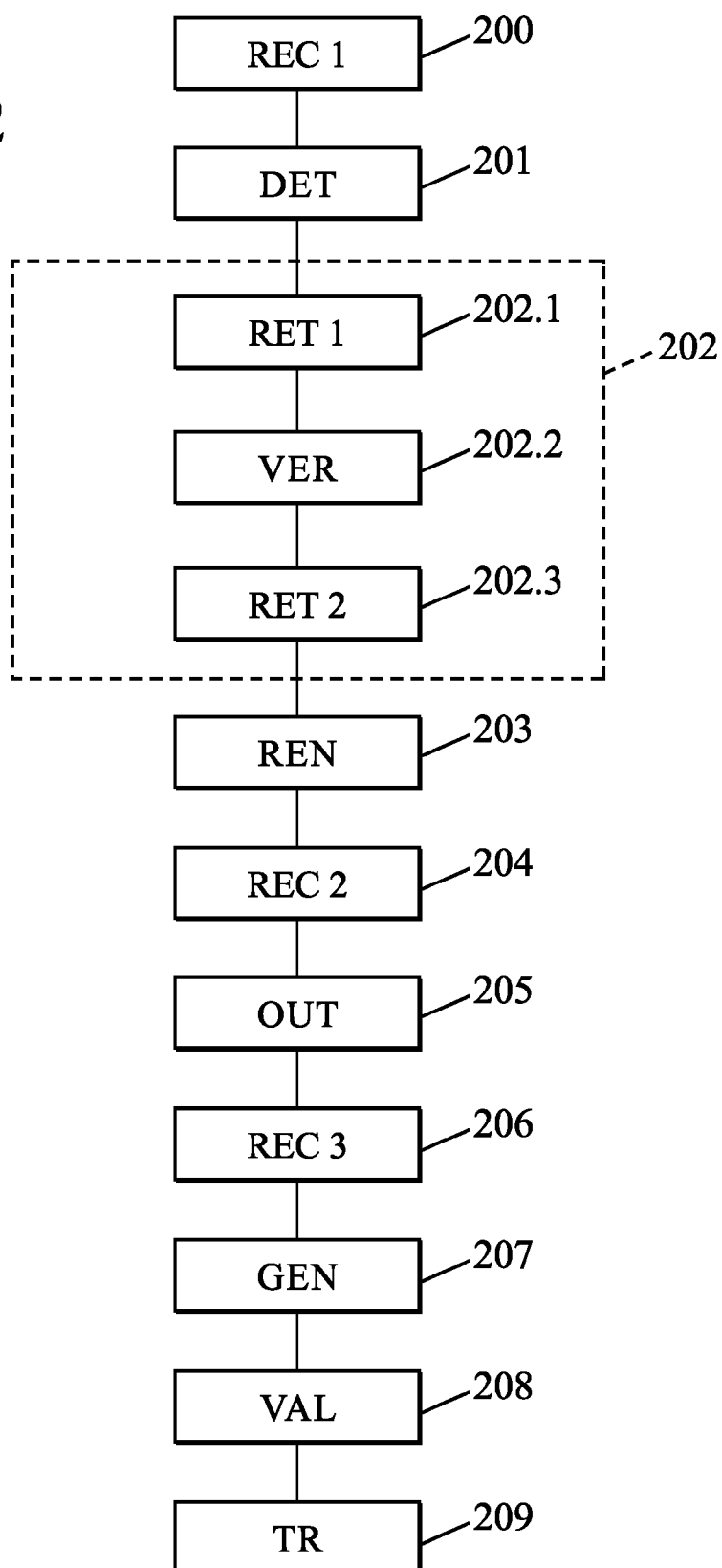


FIG. 1

FIG. 2



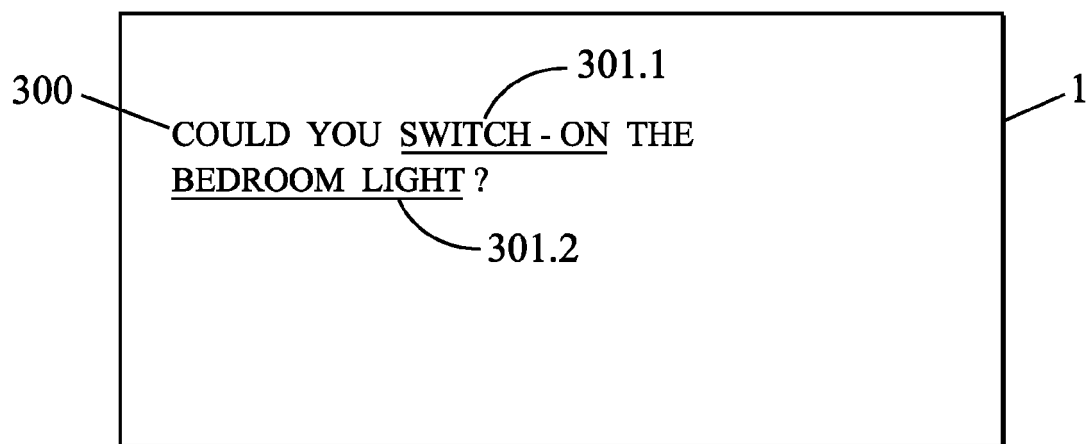


FIG. 3a

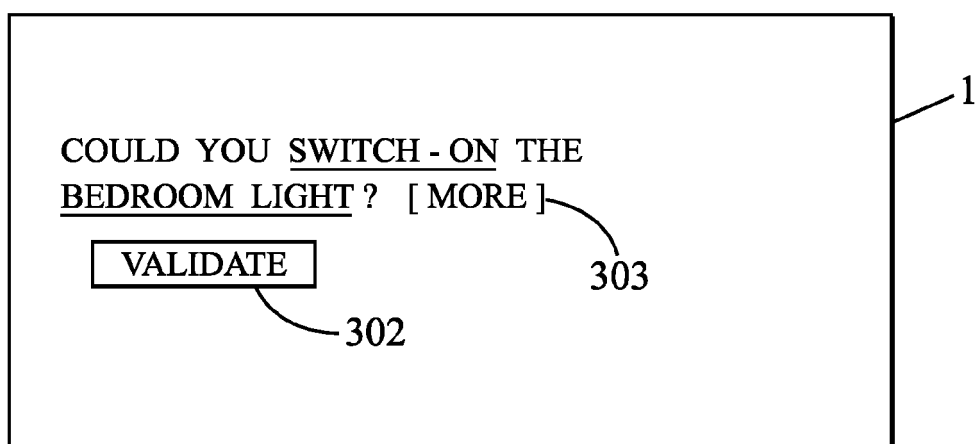


FIG. 3b

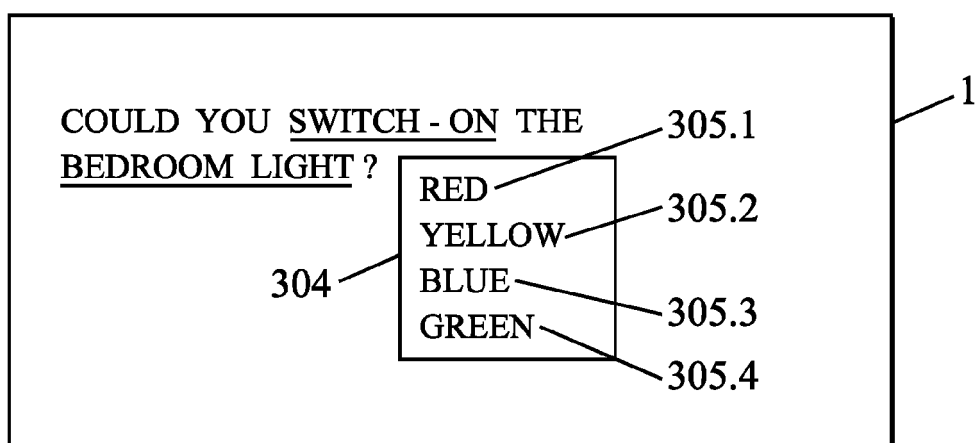


FIG. 3c

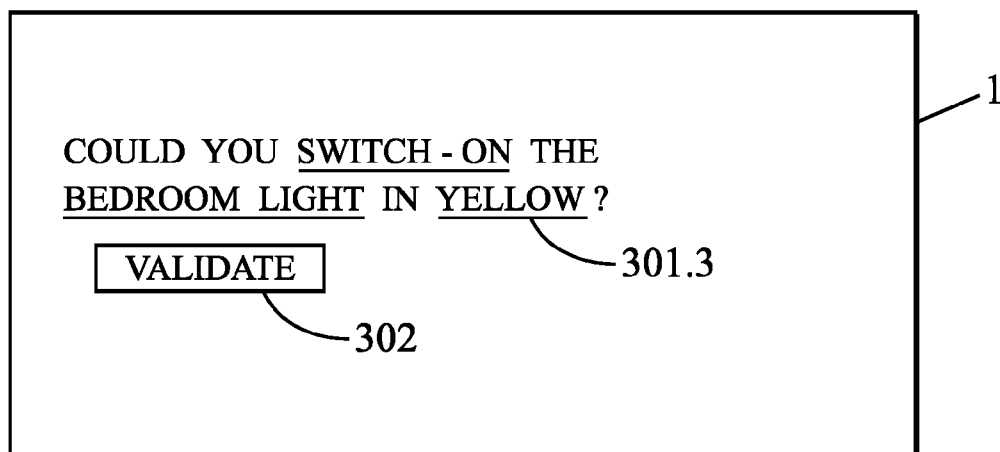


FIG. 3d

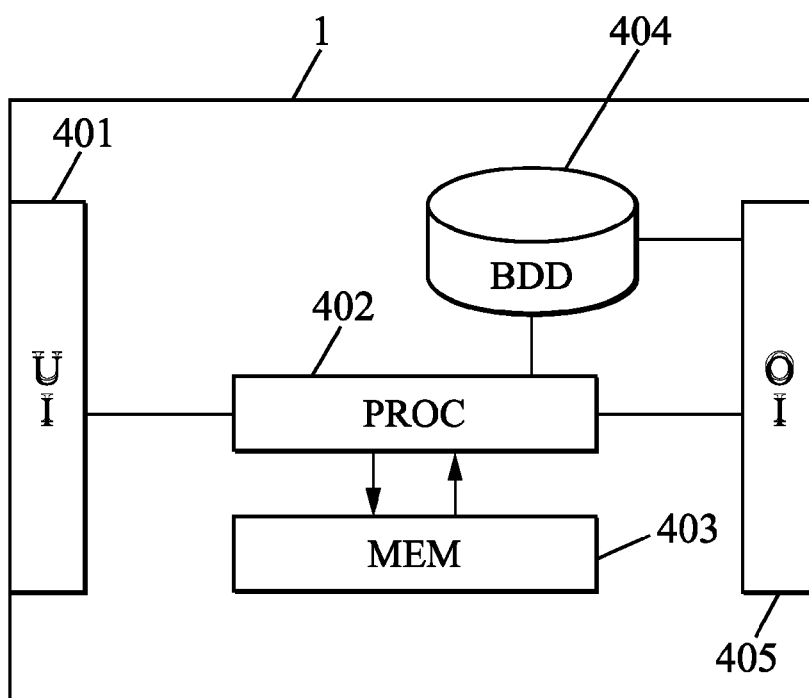


FIG. 4



## EUROPEAN SEARCH REPORT

Application Number  
EP 15 30 6052

5

10

15

20

25

30

35

40

45

50

55

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                       |                                                     |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                         | Relevant to claim                                   | CLASSIFICATION OF THE APPLICATION (IPC) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP 2 515 610 A1 (SAMSUNG LED CO LTD [KR])<br>24 October 2012 (2012-10-24)                             | 1-6,9-11                                            | INV.<br>G08C17/00<br>H05B37/02          |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | * paragraph [0081] - paragraph [0098] *<br>* paragraph [0113] - paragraph [0130] *                    | 7,8                                                 |                                         |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2008/034081 A1 (MARSHALL KEVIN [US] ET AL)<br>7 February 2008 (2008-02-07)<br>* paragraph [0131] * | 7,8                                                 |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                       |                                                     | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                       |                                                     | G08C<br>H05B<br>H04N<br>G10L            |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                       |                                                     |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                       | Date of completion of the search<br>2 December 2015 | Examiner<br>Baas, Gert-Jan              |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                       |                                                     |                                         |

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 30 6052

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-12-2015

10

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| EP 2515610 A1                             | 24-10-2012          | CN 102752910 A             | 24-10-2012          |
|                                           |                     | EP 2515610 A1              | 24-10-2012          |
|                                           |                     | US 2012268365 A1           | 25-10-2012          |
| -----                                     |                     |                            |                     |
| US 2008034081 A1                          | 07-02-2008          | US 2008034081 A1           | 07-02-2008          |
|                                           |                     | US 2012098636 A1           | 26-04-2012          |
|                                           |                     | US 2013335204 A1           | 19-12-2013          |
|                                           |                     | US 2014203922 A1           | 24-07-2014          |
|                                           |                     | WO 2008019334 A2           | 14-02-2008          |
| -----                                     |                     |                            |                     |

15

20

25

30

35

40

45

50

55

EPO FORM P0459

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