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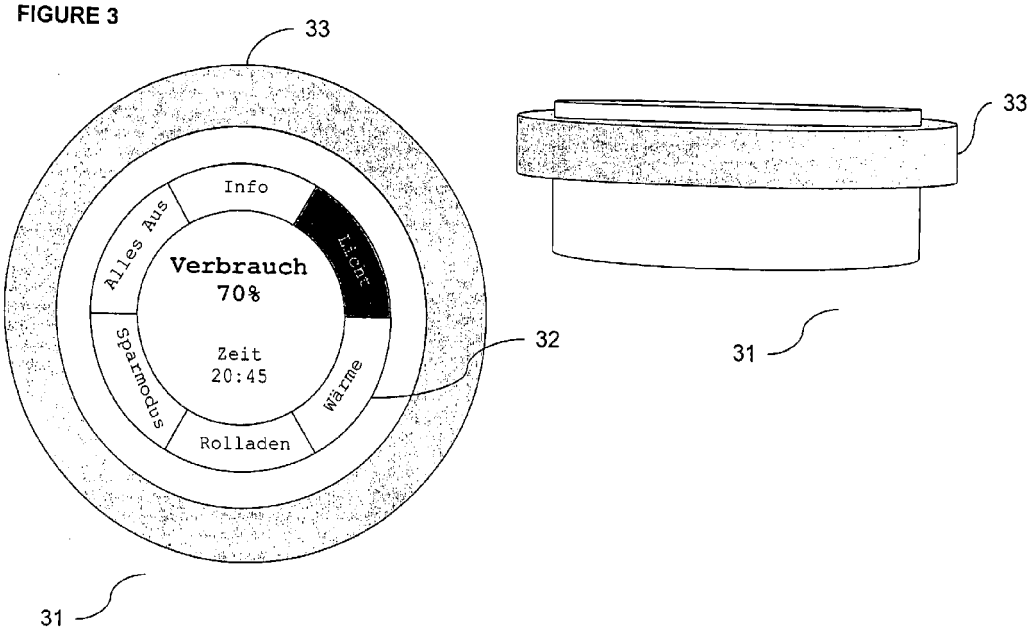
Remarks:
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(54) Integrated home information platform

(57) The present invention relates to a controlling device and a control system. In particular, it provides an integration platform with intuitive functionality to wirelessly control energy consumption and to create transparency on the sources of energy consumption.

In accordance with an aspect of the invention, there is provided a controlling device comprising:
a transceiver configured to receive data signals and to transmit control signals wirelessly;
a processor configured to generate the control signals and to extract data to be stored from the data signals;
a memory for stori ng the data;
a circular display; and
input means;
wherein the input means are arranged around the circular display and are adapted to enable a user to select a desired function from a plurality of functions of the controlling device comprising one or more of the following functions: receiving, handling, and displaying of data signals and handling and transmitting of control signals.

FIGURE 3



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Description

[0001] The present invention relates to control systems, a controlling device, a controlled device and a corresponding method. In particular, it provides an integration platform with intuitive functionality to wirelessly control energy consumption (Convenience) and to create transparency on the sources of energy consumption (Efficiency).

[0002] Efficiency: According to the information of the Umweltbundesamt each year more than four billion euros are wasted by the inefficient use of electronic devices. That means 100€ per household on average. According to the Deutsche Energieagentur, a state owned body, 10% of the home heating budget can be saved through adapting the user behaviour. That equals 260€ per annum for an average one family home.

[0003] Although there is a clear need for ways to save energy and to create transparency on the sources of energy consumption users have no sufficient knowledge apart from the yearly energy bill that provides only lump sum information. For example the energy consumption of a standby personal computer workplace could be up to 200€ per year which is money that could be easily saved if there would be a means to make this waste of energy transparent to the consumer. The need to save energy is also expressed by consumers themselves. According to a web survey, the 2nd most important smart home applications in the future is "energy saving".

[0004] Convenience: Although consumers have become used to high-tech in most areas of modern living such as the automobile they still lack that same level of automation at home. Consequently, the missing equipment is gathered from multiple vendors and leaves the user with a multitude of electronic devices.

[0005] Hence there is need for an integrated solution that helps to manage this complexity and that offers an intuitive functionality. According to the same web survey one of the top buying criteria for smart home solutions is the "ease of use" ranked even higher than the criteria "price".

[0006] The need for an integrated solution becomes visible when considering the current state of technology. Today there is no integrated solution to monitor and to influence energy consumption while enjoying the comfort of wireless home automation such as adapting room light and temperature to the users convenience from any place at home. There is no solution to meter and influence energy consumption of household devices on transactional level while enjoying the convenience of dimming the light, turning of all household appliances by "one touch", or changing room temperature from any place at home. Currently no solution exists that integrates this with a simple to use web user interface that contains up-to-date energy consumption information of the entire household that allows the user to recognize ways to reduce energy consumption even more effectively.

[0007] Currently there are two different types of home automation solutions: the high end solutions that include appliance control with broadband functionalities such as media broadcast. These complex high end solutions often involve substantial installation effort so that installation is restricted to newly build homes.

[0008] On the other hand, there are the low end solutions that focus on the automation of a specific appliance such has heating or lighting. These solutions usually are low cost and involve an easy installation procedure so that they can be installed into any home. However these solutions are manufacturer specific and can not be integrated with other home automation solutions.

[0009] Therefore, there is e.g. a need for an integrated solution for controlling a plurality of appliances consuming energy and for monitoring an energy consumption of these appliances.

[0010] For this and other reasons, there is a need for the present invention.

[0011] In accordance with an aspect of the invention, there is provided a control system, comprising:

a controlling device comprising a transceiver, a processor, and a memory;
at least one controlled device wirelessly connected to the controlling device and comprising a transceiver, a processor, and a memory;
wherein the controlling device is configured to send control signals to at least one of the at least one controlled device and to receive data signals from at least one of the at least one controlled device; and
wherein each of the at least one controlled device is configured to receive the control signals from the controlling device and to send the data signals to the controlling device.

[0012] Advantageously, one of the at least one controlled device is connected between an appliance and a electric power supply which provides the appliance with electric power.

[0013] Advantageously, the one of the at least one controlled device further comprises an electricity meter for measuring electrical energy consumption of the appliance connected to the one of the controlled devices.

[0014] Advantageously, the one of the at least one controlled device further comprises an on-off switch for powering up or cutting off the appliance connected to the at least one controlled device.

[0015] Advantageously, the one of the at least one controlled device further comprises a dimmer for reducing electric power supplied to the appliance connected to the at least one controlled device.

[0016] Advantageously, one of the at least one controlled device further comprises a short range transmitter and an actuator, the short range transmitter being adapted to transmit a device address of the respective controlled device when activated by a user operating the actuator. Advantageously, one of the at least one controlled device further comprises a function ring defining a func-

tion of the respective controlled device.

[0017] Advantageously, the function ring is coloured, the colour indicating the user the function of the respective controlled device.

[0018] Advantageously, the controlling device further comprises a timer for initiating an operation at a user-defined time, for example powering up or cutting off the appliance connected to one of the at least one controlled device at a user-defined time.

[0019] Advantageously, one of the at least one controlled device is a remotely controllable thermostat, the thermostat further comprising:

a metering device for measuring heat energy consumption of the appliance connected to the thermostat;
an actuator for controlling an heat energy output level.

[0020] Advantageously, the data signals sent from one of the at least one controlled device to the controlling device comprise data of the measured energy consumption of the appliance connected to the one of the at least one controlled device.

[0021] Advantageously, the control system further comprises a personal computer wirelessly connected to the controlling device and the Internet.

[0022] Advantageously, the appliances connected to the at least one controlled device are selected from a group containing household appliances, entertainment electronics devices, security devices, and electronic shutters.

[0023] In accordance with a further aspect of the invention, there is provided a controlling device comprising:

a transceiver configured to receive data signals and to transmit control signals wirelessly;
a processor configured to generate the control signals and to extract data to be stored from the data signals;
a memory for storing the data;
a circular display; and
input means;
wherein the input means are arranged around the circular display and are adapted to enable a user to select a desired function from a plurality of functions of the controlling device comprising one or more of the following functions: receiving, handling, and displaying of data signals and for handling and transmitting of control signals.

[0024] Advantageously, the input means comprise a ring-shaped control element which is turnable with respect to the remainder of the controlling device.

[0025] Advantageously, the ring-shaped control element is pushable.

[0026] Advantageously, the controlling device is cylinder-shaped, disc-shaped, lentoid, or hemispherical.

[0027] Advantageously, the controlling device further comprises a graphical user interface for facilitating the selection of the desired function from the plurality of functions of the controlling device by the input means.

[0028] Advantageously, the graphical user interface comprises a circular menu for facilitating the selection of the desired function from the plurality of functions of the controlling device by the input means.

[0029] Advantageously, the plurality of functions provided by the controlling device includes:

accessing and displaying a desired portion of the stored data;
remotely controlling controlled devices wirelessly connected to the controlling device.

[0030] Advantageously, the function of remotely controlling the controlled devices includes: causing one of the controlled devices to power up or cut off an assigned appliance; causing one of the controlled devices to power up or cut off an assigned appliance at a user-defined time; causing one of the controlled devices to reduce or increase energy supplied to an assigned appliance.

[0031] Advantageously, the controlling device is adapted to register controlled devices with their respective device address.

[0032] Advantageously, the controlling device is further adapted to assign the registered controlled devices to a location.

[0033] In accordance with a further aspect of the invention, there is provided a control system comprising:

a controlling device as defined above;
at least one controlled device wirelessly connected to the controlling device and each comprising a transceiver, a processor, and a memory;
wherein each of the at least one controlled device is configured to receive the control signals from the controlling device and to send the data signals to the controlling device.

[0034] In accordance with a further aspect of the invention, there is provided a controlled device for use in a system as defined above, wherein
the controlled device is wirelessly connected to a controlling device,
comprises a transceiver, a processor, and a memory, and is configured to receive control signals from the controlling device and to send data signals to the controlling device.

[0035] Advantageously, the controlled device is a remotely controllable thermostat further comprising:

a metering device for measuring heat energy consumption of the appliance connected to the thermostat;
an actuator for controlling an heat energy output level.

[0036] In accordance with a further aspect of the invention, there is provided a method for use in a control system comprising a controlling device and at least one controlled device wirelessly connected to the controlling device, the method comprising:

transmitting, by the controlling device, control signals to the at least one controlled device;
receiving, by the controlling device, control signals from the at least one controlled device;
measuring, by the at least one controlled device, an energy consumption of appliances connected to the at least one controlled device;
wherein the control signals comprise commands for performing at least one of the following steps:

causing one of the at least one controlled device to send data signals to the controlling device, the data signals comprising the measured energy consumption values of an appliance connected to the one of the at least one controlled device;
causing one of the at least one controlled device to power up or cut off an appliance connected to the one of the at least one controlled device;
causing one of the at least one controlled device to power up or cut off an appliance connected to the one of the at least one controlled device at a user-defined time;
causing one of the at least one controlled device to reduce energy supplied to an appliance connected to the one of the at least one controlled device.

[0037] Advantageously, the method further comprises:

storing the measured energy consumption values of the controlled devices; and
accessing and displaying a desired portion of the stored energy consumption values.

Brief description of the drawings

[0038] The accompanying drawings are included to provide a further understanding of the present invention and are incorporated and constitute a part of this specification. The drawings illustrate embodiments of the present invention and together with the description serve to explain the principles of the invention. Other embodiments of the present invention will be readily appreciated as they become better understood by reference to the following detailed description.

Figure 1 shows an exemplary and simplified schematic diagram of a control system according to an embodiment of the invention;

Figure 2 shows an exemplary and simplified illustration of a controlled device according to an embodiment of the invention.

Figure 3 shows two exemplary and simplified views of a controlling device according to an embodiment of the invention.

Detailed description of the invention

[0039] Figure 1 shows an exemplary and simplified schematic diagram of a control system according to an embodiment of the invention.

[0040] The control system 10 comprises a controlling device 11 wirelessly connected to at least one multi-purpose controlled device 12a, 12b or to at least one dedicated controlled device 14a, 14b, wherein each of the at least one controlled device 12a, 12b, 14a, 14b is connected to a respective appliance 13a, 13b, 13c, 13d.

[0041] Advantageously, the control system 10 further comprises a personal computer 15 wirelessly connected to the controlling device 11 and the Internet 16.

[0042] The exemplary control system 10 of Figure 1 comprises respectively two multi-purpose controlled devices 12a, 12b, two dedicated controlled devices 14a, 14b, and four appliances 13a, 13b, 13c, 13d. However, the control system 10 may comprise any number of the latter apparatuses, may even comprise more than one controlling device 11.

[0043] The appliances 13a, 13b, 13c, 13d may be, for example, household appliances like, for example, a washing-machine, dryer, dish-washer, etc. or may also be a television set, a hi-fi system, or some other kind of entertainment electronics device as well as any other kind of electric appliance, like electric shutters or security devices.

[0044] The multi-purpose controlled devices 12a, 12b, hereinafter also just referred to as controlled devices 12a, 12b, are in communication with the controlling device 11 and are connected between a respective appliance 13a, 13b and its power supply. Figure 2 shows one exemplary embodiment of a controlled device 22. It is a kind of adapter which can be plugged in a power socket and which comprises a power socket suitable for the power plug of the appliance to be plugged in.

[0045] The controlled device 22 further comprises a transmitter, and an actuator 23 which enable a user to register the respective controlled device 22 at the controlling device 11. To register the controlled device 22 at the controlling device, the user operates the actuator 23 which activates the transmitter, preferably a short range radio transmitter. The transmitter will then send the device address of the controlled device 22 to the controlling device 11 which will register the controlled device 22 using the transmitted unique device address of the controlled device 22.

[0046] Advantageously, the controlled device 22 comprises a detachable coloured function ring 24 which indicates the user as well as the controlled device 22 the

function of the appliance connected to the controlled device 22. The function ring 24 may comprise a plurality of pins which are plugged in corresponding sockets of the controlled device 22, wherein the arrangement of the pins indicate the controlled device 22 the function of the appliance connected to the controlled device 22. The function rings 24 further indicate the user respective functions via assigned colours: "red" may represent "heating", "green" may represent "lighting", "blue" may represent "washing", etc. Accordingly, the user may select a function ring 24 according to the function of appliance connected to the controlled device 22. By attaching the function ring 24 to the controlled device 22, i.e. inserting the pins of the function ring 24 into the corresponding holes of the controlled device 22, the user assigns a particular function to the controlled device 22. Depending on the assigned function, the controlled device 22 can perform different operations: If the function is "washing" the operations include powering up and cutting off the appliance connected to the controlled device 22. If the function is "lighting" the operations further include reducing energy supplied to the appliance connected to the controlled device 22.

[0047] Hereafter, the user may specify certain attributes of the appliance connected to the controlled device 22, the attributes including the name of the appliance, such as ceiling lamp, washing-machine, etc., the location and room, respectively, to which the appliance is allocated, e.g. living-room, kitchen, etc., and other attributes.

[0048] The controlled device 22 further comprises a processor, a memory, and an electricity meter. The electricity meter measures the electrical energy consumption of the appliance connected to the controlled device 22 and the measured energy consumption data is stored in the memory. When requested by the controlling device 11, the transceiver transmits the stored energy consumption data to the controlling device 11. Alternatively, the transceiver may continuously transmit the stored energy consumption data to the controlling device 11. In both cases, instant feedback on energy savings can be provided.

[0049] The controlled device 22 further comprises an on-off switch or interruptor for powering up or cutting off the appliance connected to the controlled device 22. Advantageously, the controlled device 22 may comprise an electrical dimmer for reducing electric power supplied to the appliance connected to the controlled device 22.

[0050] The transceiver of the controlled device 22 transmits energy consumption data to the controlling device 11, as already noted above, and receives control data signals from the controlling device 11. These control signals may cause the controlled device 22 to send energy consumption data to the controlling device 11 or may cause the controlled device 22 to power up or cut off the appliance connected to the controlled device 22, for example.

[0051] As already noted above, the system 10 may further comprise at least one dedicated controlled device 14a, 14b. In contrast to the "multi-purpose" controlled device 22 illustrated above, a dedicated controlled device has a determined "dedicated" function and therefore, its function ring is non-detachable.

[0052] In the following, a remotely controllable thermostat for temperature control of a radiator or another kind of heating installation will be illustrated as an example for a dedicated controlled device. The remotely controllable thermostat comprises a metering device for measuring heat energy consumption, an actuator for controlling an heat energy output level electronically, a transceiver, a processor, memory for storing the measured heat energy consumption, and means for registering the thermostat at the controlling device 11.

[0053] The transceiver receives control data signals from the controlling device 11 and transmits heat energy consumption data to the controlling device 11. Further, the transceiver forwards received control data signals to the processor which causes appropriate actions according to the received control data signals: Causing the transceiver to send heat energy consumption data to the controlling device 11; or causing the actuator for controlling an heat energy output level to reduce or increase the heat energy output level of the heating installation to a user-defined value comprised in the received control data signals, for example.

[0054] The registration process may preferably be identical or similar to the one employed for registering the controlled device 22. Accordingly, the means for registering may comprise a transmitter for sending a unique device address of the thermostat to the controlling device 11, and an actuator for starting the registration process.

[0055] Figure 3 shows two exemplary and simplified views of a controlling device according to an embodiment of the invention.

[0056] The controlling device 31 comprises a display 32, e.g. a liquid crystal display, a control element 33, a transceiver, and a processor having an associated memory.

[0057] The controlling device 31 is adapted to provide the user with information such as e.g. electric and heat energy consumption of connected appliances and to enable the user to remotely control controlled devices 12a, 12b, 14a, 14b, which are wirelessly connected to and registered at the controlling device 31.

[0058] As the controlling device 31 represents a mobile central information and control platform which the user should be able to handle like conventional remote controls, it is of a shape and size suitable to lie in one hand of the user so that the user can operate the device with his other hand.

[0059] Conveniently, the controlling device 31 is of a circular shape, e.g. cylinder-shaped, disc-shaped, hemispherical, or lentoid, the display is circular, and the control element 33 is ring-shaped.

[0060] Advantageously, the ring-shaped control element 33 is turnable with respect to the remainder of the

controlling device 31. Movements of the ring-shaped control element 33 are detected and monitored. The movement monitoring of the ring-shaped control element 33 may be implemented in different ways well-known in the art. Therefore, only one exemplary embodiment of the movement control will briefly be mentioned here: Similarly to a conventional mechanical computer mouse of a personal computer, movements of the ring-shaped control element 33 are transferred to a small rotating cylinder, which is comprised in the controlling device and touches the turnable ring-shaped control element 33. The movements of the small rotating cylinder are converted, e.g. by means of a helical potentiometer, into electrical signals.

[0061] Advantageously, the turnable ring-shaped control element 33 is pushable, i.e. it also includes an actuator.

[0062] A graphical user interface (GUI) implemented by the processor facilitates selecting between a plurality of functions featured by the controlling device 31. The graphical user interface depicts a ring-shaped menu having a plurality of options arranged circularly at the rim of the circular display 32. The remaining area within the ring-shaped menu serves as general information field and/or for displaying contents associated with a selected, and thus active, menu option. For example, status information about an actual controlled appliance and an energy consumption level of the actual controlled appliance may be displayed in the center of the GUI. In Figure 3, an exemplary picture of the main menu of the GUI is displayed.

[0063] The ring-shaped control element 33 acts as "mouse" for selecting a respective menu option. The user can switch from one menu option to the next by turning the ring-shaped control element 33 rightwards or leftwards (clockwise/ anti-clockwise). The current menu option is highlighted and can be selected by the user by operating the actuator included in the turnable ring-shaped control element 33, i.e. by pressing the turnable ring-shaped control element 33 down.

[0064] By selecting a menu option of the main menu, the user can get to the respective submenu.

[0065] To ensure simple and intuitive operation of the controlling device 31, both the number of menu options, and the number of submenu levels (i.e. the maximal number of clicks necessary to select any function) have to be kept as small as possible. In a preferred embodiment, the GUI menu comprises six menu options (see Figure 3) and two submenu levels at most.

[0066] The controlling device 31 provides three main functionalities:

- Registering and specifying controlled devices 12a, 12b, 14a, 14b together with their associated appliances 13a, 13b, 13c, 13d;
- Displaying a plurality of diversified energy consumption information;
- Enabling a user to control a plurality of appliances in communication with the controlling device 31 remotely and wirelessly.

[0067] The registration process has already been described in context with the description of the controlled device 22.

[0068] After registering, the appliance connected to the just registered controlled device are specified by the user utilizing the GUI menu of the controlling device 31: The just registered appliance may appear as a menu option "new appliance" and, after selecting this option, characteristics of the "new appliance" may be specified in respective subordinate menu items, wherein the characteristics may include the name of the appliance, e.g. ceiling lamp, washing-machine, etc., the location and room, respectively, to which the appliance is allocated, e.g. living-room, kitchen, etc., and other specifications. For easier handling, the user may preferably choose between a plurality of default options to specify the "new appliance".

[0069] Advantageously the controlling device comprises a timer for powering up or cutting off an appliance connected to a corresponding controlled device at a user-defined time.

[0070] The controlling device 31 provides the user with a broad spectrum of diversified energy consumption information. In the main menu, the total energy consumption, as an absolute value and/or as a percentage of a maximum total energy consumption, is indicated in the central information field of the GUI. By selecting respective submenus, the user can get information about the energy consumption of a certain function group, such as lighting, heating, washing, etc., in a certain room, or of one specified appliance, wherein the respective energy consumption may be given as a current energy consumption or as an energy consumption during a certain time period (e.g. day, week, month, year) and again, may be given as a total value or as a percentage of a respective maximum energy consumption.

[0071] The controlling device 31 further enables the user to wirelessly control a plurality of appliances which are in communication with the controlling device 31. To select a certain appliance or a group of appliances, the user can search in the GUI menu hierarchy and select the respective appliance or group. Then, depending on the selected appliance or group, the user can choose between several "standard" options:

- Switching on/off the respective appliance or all appliances of the group;
- Switching on/off the respective appliance or all appliances of the group at a certain user-defined time;
- Reducing or increasing the energy supplied to the respective appliance or to all appliances of the group.

[0072] Further "special" options may be provided for certain appliances, such as e.g. opening or closing electric shutters.

[0073] Furthermore, an additional option may be pro-

vided for switching off all appliances wirelessly connected to the controlling device 31.

[0074] It is noted that the handling of the GUI menu is intuitive: For switching from one option to another, and for increasing/decreasing a certain value (energy consumption, etc.), the user turns the turnable ring-shaped control element 33 clockwise or anti-clockwise. For selecting a certain currently highlighted option, the user presses the also pushable ring-shaped control element 33.

[0075] Again referring to Figure 1, the control system 10 advantageously further comprises a personal computer 15 wirelessly connected to the controlling device 11 and the Internet 16. In this preferred embodiment of the invention, the controlling device 11 stores received energy consumption data in the memory until it automatically links to the personal computer 15 for transferring the energy consumption data to the personal computer 15. Then, a user may transfer the energy consumption data to an internet platform, which enables the user to compare his energy consumption pattern with energy consumption patterns of other users. Privacy is protected by providing a common identification process for verifying a user identity.

Claims

1. A controlling device (31) comprising:

a transceiver configured to receive data signals and to transmit control signals wirelessly;
a processor configured to generate the control signals and to extract data to be stored from the data signals;
a memory for stori ng the data;
a circular display (32); and
input means;
wherein the input means are arranged around the circular display (32) and are adapted to enable a user to select a desired function from a plurality of functions of the controlling device (31) comprising one or more of the following functions: receiving, handling, and displaying of data signals and handling and transmitting of control signals.

2. The controlling device (31) of claim 1, wherein the input means comprise a ring-shaped control element (33) which is turnable with respect to the remainder of the controlling device (31).

3. The controlling device (31) of claim 2, wherein the ring-shaped control element (33) is pushable.

4. The controlling device (31) of one of the preceding claims, further comprising a graphical user interface for facilitating the selection of the desired function from the plurality of functions of the controlling device (31) by the input means.

5. The controlling device (31) of claim 4, wherein the graphical user interface comprises a circular menu for facilitating the selection of the desired function from the plurality of functions of the controlling device by the input means.

6. The controlling device (31) of one of the preceding claims, wherein the controlling device is further configured to register controlled devices with their respective device address.

7. The controlling device (31) of claim 6, wherein the controlling device is further adapted to assign the registered controlled devices to a location.

8. The controlling device of one of the preceding claims, wherein the plurality of functions provided by the controlling device further includes:

accessing and displaying a desired portion of the stored data;
remotely controlling controlled devices wirelessly connected to the controlling device.

9. The controlling device of claim 8, wherein the function of remotely controlling the controlled devices includes:

causing one of the controlled devices to power up or cut off an assigned appliance;
causing one of the controlled devices to power up or cut off an assigned appliance at a user-defined time;
causing one of the controlled devices to reduce or increase energy supplied to an assigned appliance.

10. The controlling device of one of the preceding claims, wherein the controlling device further comprises a timer for initiating an operation at a user-defined time.

11. A control system (10), comprising:

a controlling device (11) as defined by any of the preceding claims;
at least one controlled device (12a, 12b, 14a, 14b) wirelessly connected to the controlling device (11) and comprising a transceiver, a processor, and a memory;
wherein the controlling device (11) is configured to send control signals to at least one of the at least one controlled device (12a, 12b, 14a, 14b) and to receive data signals from at least one of the at least one controlled device (12a, 12b, 14a,

14b); and
wherein each of the at least one controlled device (12a, 12b, 14a, 14b) is configured to receive the control signals from the controlling device (11) and to send the data signals to the controlling device (11).

12. The control system (10) of claim 11, wherein one of the at least one controlled device (12a, 12b, 14a, 14b) is connected between an appliance (13a, 13b) and an electric power supply which provides the appliance (13a, 13b) with electric power.

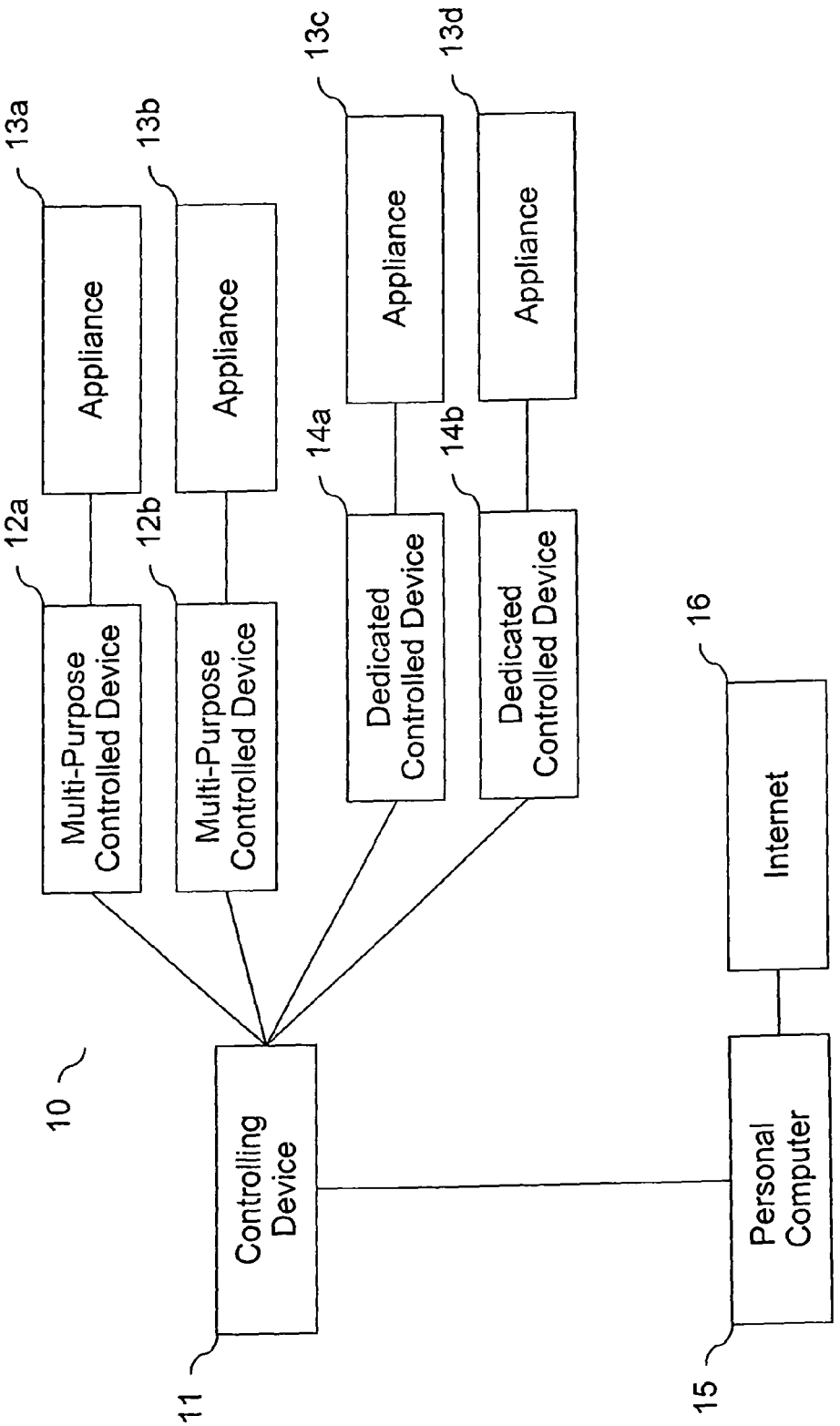
13. The control system (10) of claim 12, wherein the one of the at least one controlled device (12a, 12b, 14a, 14b) further comprises an electricity meter for measuring an electrical energy consumption of the appliance (13a, 13b) connected to the one of the at least one controlled device.

14. The control system (10) of claim 11, wherein one of the at least one controlled device (12a, 12b, 14a, 14b) is a remotely controllable thermostat, the thermostat further comprising:

a metering device for measuring heat energy consumption of the appliance connected to the thermostat;
an actuator for controlling an heat energy output level.

15. The control system (10) of claim 13 or 14, wherein the data signals sent from the one of the at least one controlled device (12a, 12b, 14a, 14b) to the controlling device (11) comprise data of the measured energy consumption of the appliance connected to the one of the at least one controlled device (12a, 12b, 14a, 14b).

FIGURE 1


10
11
Controlling Device
12a
Multi-Purpose Controlled Device
12b
Multi-Purpose Controlled Device
13a
Appliance
13b
Appliance
13c
Appliance
13d
Appliance
14a
Dedicated Controlled Device
14b
Dedicated Controlled Device
15
Personal Computer
16
Internet

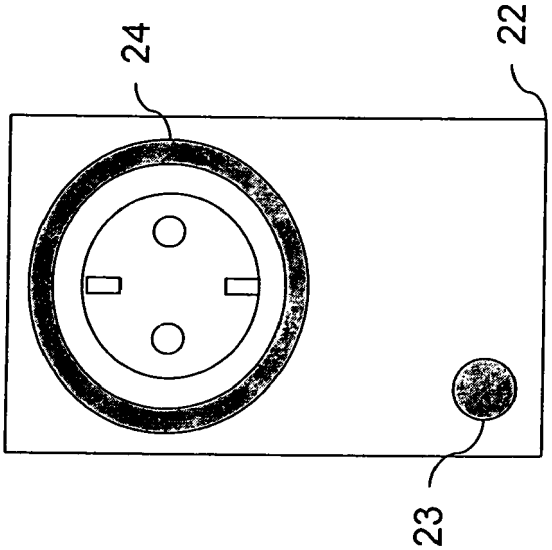


FIGURE 2

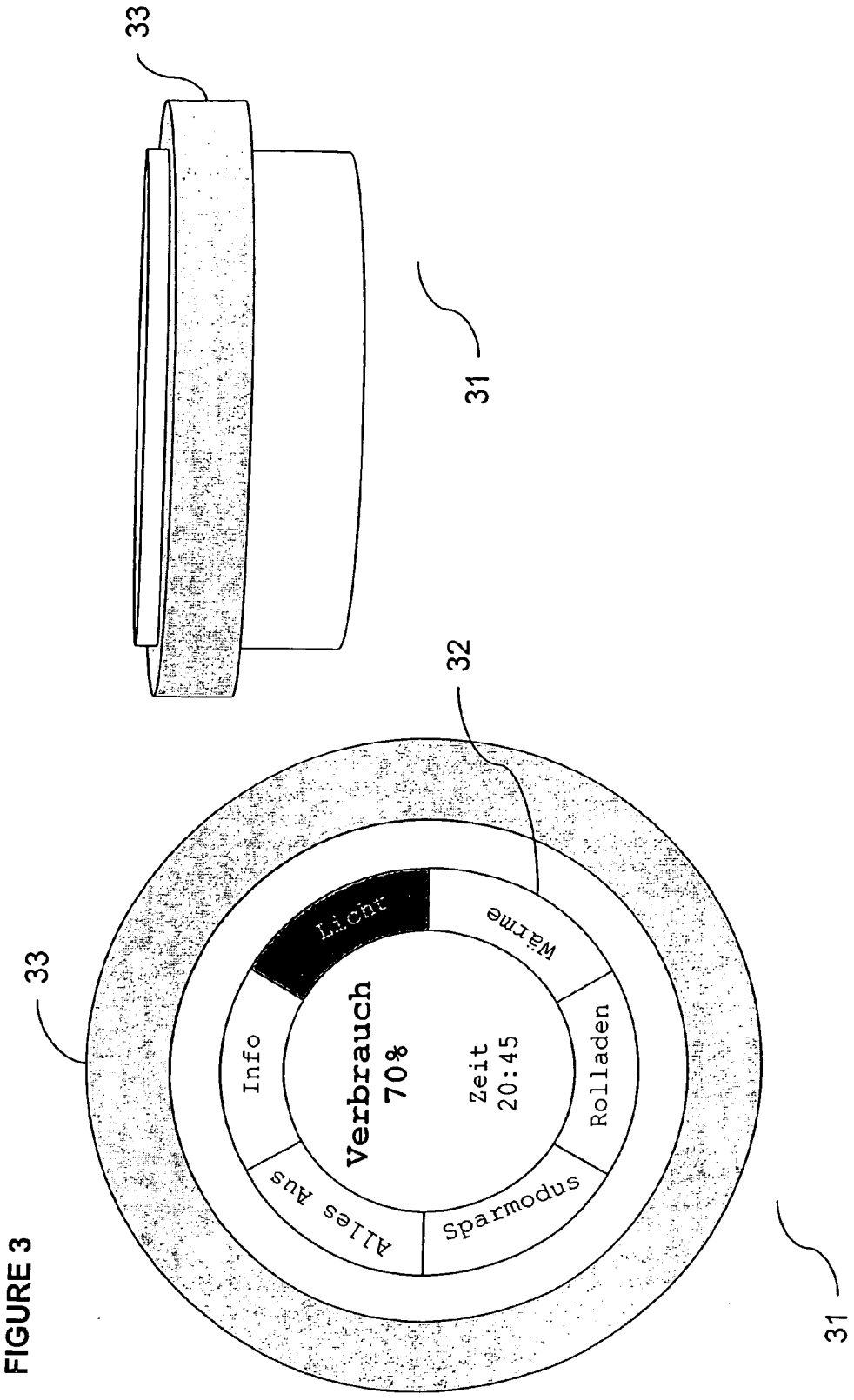

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Alles Aus
Sparmodus
31

FIGURE 3

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 6161

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 Y	US 2003/122698 A1 (HORIE HIROMASA [JP] ET AL) 3 July 2003 (2003-07-03) * paragraph [0042] - paragraph [0071] * * paragraph [0079] - paragraph [0085] * -----	1-9,11, 12,14 10	INV. G08C17/02
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Y	US 5 287 109 A (HESSE DAVID [CA]) 15 February 1994 (1994-02-15) * column 2, line 34 - column 3, line 60 * -----	10	

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G08C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 November 2012	Pham, Phong

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 ON EUROPEAN PATENT APPLICATION NO. EP 12 00 6161

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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