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(54) **A method and system for remote control**

(57) A controllable device (110) comprising at least one controllable component (114), characterized in that the controllable device (110) comprises:

- memory (113) storing a software GUI (Graphical User Interface) component configured to provide a graphical user interface for operating the controllable component (114) by commands generated in response to user navigation actions; a communication interface (111) configured to communicate with an external controller (120)

having a GUI module (125) and an input interface (126); and an external controller manager (112) configured to communicate, via the communication interface (111), with the external controller (120) to: send the software GUI component from the memory (113) to the external controller (120); receive from the external controller (120) commands; and send the received commands to the controllable component (114).

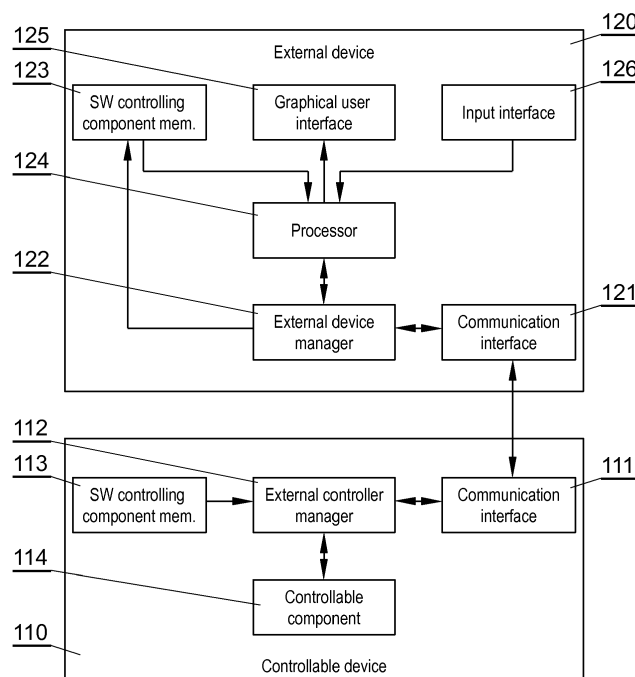


Fig. 2

Description

TECHNICAL FIELD

[0001] The present invention relates to remote controlling of devices, in particular of devices having no embedded graphical user interface or embedded graphical user interface with limited capabilities.

BACKGROUND

[0002] There are some devices which offer sophisticated controllable functionality, but have no embedded graphical user interface, e.g. due to their miniaturization (so that there is no space for a dedicated screen) or operation at places inaccessible for the user (so that the dedicated screen would be inaccessible for the user). Other devices may have a simplified user interface, e.g. a small screen only to minimize costs or space occupied by the screen. For such devices, there exists a need to provide an external user interface, which could allow convenient control of the device by the user.

[0003] There are also known devices with dedicated user interfaces, operating via dedicated communication channels. For example, a television set may be operated by a remote controller, which communicates with the television set at a certain infrared frequency and sends predefined codes to invoke certain functionality of the television set (such as change of channel or volume), wherein the remote controller may have predefined buttons or a touch screen displaying a predefined user interface screen.

[0004] Nowadays, the number of devices used at home increases. Use of a dedicated controller for each device is problematic for the user, because each controller may have different user interface. Moreover, as the number of controllers increases, a controller can be easily lost or confused with another controller. It would be more efficient to simplify the control of devices by using a universal controller.

SUMMARY

[0005] The problems mentioned above have been solved by providing a controllable device which has a controllable component which can be controlled via a software graphical user interface (GUI) component, where the controllable device can send the software GUI component to an external controller, such as to enable the navigation of the software component via the GUI and via the input interface of the external device.

[0006] There is presented a controllable device comprising at least one controllable component. The controllable device comprises: - memory storing a software GUI (Graphical User Interface) component configured to provide a graphical user interface for operating the controllable component by commands generated in response to user navigation actions; a communication interface con-

figured to communicate with an external controller having a GUI module and an input interface; and an external controller manager configured to communicate, via the communication interface, with the external controller to: send the software GUI component from the memory to the external controller; receive from the external controller commands; and send the received commands to the controllable component.

[0007] Preferably, the memory stores a plurality of software GUI components.

[0008] Preferably, the memory stores a link to a software GUI component at a remote location.

[0009] There is also presented a system for remote control, wherein the system comprises: the controllable device as described above, the external controller comprising: a communication interface configured to communicate with the controllable device, a memory for storing the software GUI component; the GUI module; the input interface module; a processor configured to operate the software GUI component to allow the user to navigate the software GUI component using the GUI module and the input interface module such as to allow the user to input navigation actions and to allow the software GUI component to generate commands in response to the input navigation actions; and a controllable device manager configured to communicate, via the communication interface, with the controllable device to: receive the software controlling component from the controllable device and store it in the memory; receive commands from the processor operating the software controlling component; and send the received commands to the controllable device.

[0010] Preferably, the external controller comprises memory configured to store a plurality of software GUI components.

[0011] There is also presented a method for remote control of a controllable device via an external controller, wherein it comprises the steps of: initiating (301, 302) communication between the controllable device and the external controller; sending a software GUI (Graphical User Interface) component from the controllable device to the external controller; receiving at the controllable device a command from the external controller; sending at the controllable device the received command to a controllable component of the controllable device.

[0012] Preferably, the method further comprises the following steps performed at the external controller: receiving and storing the software GUI component in a memory; executing the software GUI component to display the GUI via a GUI module; receiving an input navigation action from user via an input interface module; generating a command in response to the input navigation action; and sending the command to the controllable device.

[0013] Preferably, the method further comprises the step of sending operational parameters of the controllable component to the software GUI component operating at the controller and communicating the parameters via

the GUI.

[0014] Preferably, the software GUI component is sent from the controllable device to the external controller after receiving input demand from user.

[0015] Preferably, the software GUI component is sent from the controllable device to the external controller automatically after initiation of the communication.

[0016] There is also presented a computer program comprising program code means for performing all the steps of the method as described above when said program is run on a computer, as well as a computer readable medium storing computer-executable instructions performing all the steps of the method as described above when executed on a computer.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

Fig. 1 shows one example of a system with a plurality of controllable devices and an external controller.

Fig. 2 shows a detailed structure of the controllable device and the external controller.

Fig. 3 shows an example of the method for remote control.

NOTATION AND NOMENCLATURE

[0018] Some portions of the detailed description which follows are presented in terms of data processing procedures, steps or other symbolic representations of operations on data bits that can be performed on computer memory. Therefore, a computer executes such logical steps thus requiring physical manipulations of physical quantities.

[0019] Usually these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. For reasons of common usage, these signals are referred to as bits, packets, messages, values, elements, symbols, characters, terms, numbers, or the like.

[0020] Additionally, all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Terms such as "processing" or "creating" or "transferring" or "executing" or "determining" or "detecting" or "obtaining" or "selecting" or "calculating" or "generating" or the like, refer to the action and processes of a computer system that manipulates and transforms data represented as physical (electronic) quantities within the computer's registers and memories into other data similarly represented as physical quantities within the memories or registers or other such information storage.

DETAILED DESCRIPTION

[0021] Fig. 1 shows one example of a system as de-

scribed herein. There are a plurality of controllable devices 110A, 110B, 110C, each of which can be controlled by the external controller 120. Therefore, the user may use a single controller 120 to communicate with each device.

[0022] In one embodiment, the software GUI component of each device 110A, 110B, 110C can be sent to the external controller 120 when the controller appears in the vicinity of the device. The software GUI component can be installed at the controller on request or automatically, for example using wireless short-range transmission means whenever a user equipped with the external controller comes close to the controllable device to be controlled.

[0023] In another embodiment, the software GUI component of each device 110A, 110B, 110C can be pre-installed at the memory of the controller 120 and activated to use the particular device when the controller appears in the vicinity of the device. Alternatively, when a plurality of devices 110A, 110B, 110C are within the communication range of the controller 120, the user may select which device is to be controlled by a particular software GUI component.

[0024] Fig. 2 shows a detailed structure of the controllable device 110 and the external controller 120.

[0025] The controllable device 110 has at least one controllable component 114.

[0026] For example, when the controllable device 110 is a coffee making machine, the controllable components 114 may be a thermostat with controllable water temperature, a pump with controllable water flow pressure and amount, a timer with controllable infusion times etc.

[0027] In another example, when the controllable device 110 is an audio player, the controllable components 114 may be modules for navigating via audio files to be played or radio stations to be listened to, or modules for changing sound parameters such as volume or balance control etc.

[0028] In a further example, when the controllable device 110 is a television set-top box, the controllable components 114 may be modules for navigating via television channels, executing and navigating additional software such as electronic program guide, or modules for changing sound or video parameters.

[0029] In yet another example, when the controllable device 110 is a washing machine, the controllable component 114 can be a washing controller for receiving input commands related to washing program, temperature, drying commands etc.

[0030] In another example, when the controllable device 110 is a lamp, the controllable component 114 can be a turn on/off switch, a light intensity or color controller etc.

[0031] In yet another example, when the controllable device 110 is a shadow curtain for a window, the controllable component 114 can be a controller for setting the times at which the curtain has to open/close etc.

[0032] The controllable device has a memory 113 in

which the software GUI component is stored. The software GUI component can be a software module in a form of a code to be compiled at the external device and/or in a binary form to be executed at the external device. Alternatively, the software GUI component may be a link to an external location, for example an Internet-accessible server, from which the actual software may be downloaded to the external device. The software GUI component is preferably in a universal form that can be executed in a plurality of operating systems that could be handled by the external device. Alternatively, there may be a plurality of software GUI components stored at the memory 113, each for a particular operating system (e.g. iOS, Android etc). When executed at the external device, the software GUI component utilizes the resources of the external device, such as its own GUI and input interface, to display its functionality via the GUI and receive input from user via the input interface and to generate commands for the controllable component 114 in response to user navigation actions. Therefore, the device 110 does not need to have its own GUI nor control interface, but can be controlled via the external controller 120.

[0033] The controllable device has a communication interface 111 configured to communicate with the communication interface 121 of the external controller 120. Preferably, the communication interface 111 is a short-range wireless interface, such as Bluetooth or NFC (Near Field Communication) in order to avoid interference with controllers that are located out of range. Alternatively, or additionally, the communication interface 121 may be a long-range wireless interface, such as WiFi or GSM, or a wired interface such as Ethernet, to allow communication with a highly remote controller 120, for example to allow the user to control a home device when the user is not at home.

[0034] An external controller manager 112 of the controllable device 110 is configured to communicate, via the communication interface 111, with the external controller 120 to handle the procedure shown in Fig. 3. The basic features of the controller manager 112 include the functionality to send the software GUI component from the memory 113 to the external controller 120, receive from the external controller 120 commands (generated by the software GUI component executed at the controller 120) and to send the received commands to the controllable component 114. Therefore, the commands for the controllable component 114 are generated by the software GUI component operating at the external controller 120 in response to the inputs of the user via the input interface 126 of the external controller 120, and the commands are sent from the controller 120 to the controllable device 110.

[0035] The external controller 120 is preferably a general-purpose mobile device, such as a smartphone, a smartwatch or a tablet.

[0036] The external controller 120 has a memory 123 for storing the software GUI component. A controllable device manager 122 is configured to operate according

to the procedure of Fig. 3, and in particular, to communicate via the communication interface 121 with the controllable device 110 to: receive the software controlling component from the controllable device 110 and store it in the memory 123.

[0037] The external controller 120 further comprises a processor 124 configured to operate the software GUI component stored in memory 123 to allow the user to navigate the software GUI component using the GUI module 125 and the input interface module 126 of the controller 120. Therefore, the user may input navigation actions via the input interface module 126, which are then sent to the software GUI component to be interpreted to generate particular commands for the controllable component.

[0038] For example, when the controllable device 110 is a coffee making machine, the GUI module 125 may display various icons indicating the possibility of selecting a coffee making action, a cleaning action, a milk frothing action, on/off action, etc - as shown schematically on Fig. 1. The input interface module 126 may be a touch input module for receiving input from the user by touching icons of the GUI for performing particular actions. Upon receiving an input at a particular area of the screen, the software GUI component determines the action to be performed and generates a corresponding command to the controllable component, for example a command to initiate flow of water by the pump of the coffee making machine 110. That command is then sent from the processor 124 to the controllable device manager 122 to be sent to the external controller manager 112 and to the controllable component 114.

[0039] Fig. 3 shows an example of the method for remote control. First, in steps 301, 302 the controllable device 110 initiates communication with the external controller 120. The communication can be initiated automatically whenever the devices are within a communication range of the interface 121. Alternatively, the communication may be initiated on demand, for example the user may input a command "search for available controllers" at the controllable device or a command "search for controllable devices" at the external controller. For example, the controller 120 may communicate its operating system and parameters of the GUI module and input interface module. Based on this information, the controllable device 110 may select an appropriate software GUI component. In step 303, the software GUI component is sent and received in step 304 at the controller 120, wherein it is stored in memory 123. Steps 303, 304 can be initiated automatically whenever the communication has been initiated. Alternatively, steps 303, 304 may be initiated on demand after the communication has been initiated, for example the user may input a command "send interface to the controller" at the controllable device or a command "receive interface from the device" at the external controller. In case the software GUI component is already installed (pre-installed) at the controller, for example when the controller has been used previously to control

the device and the software GUI component has not been erased from its memory, steps 303, 304 can be omitted. Then, the software GUI component is executed by the controller 120 to display to the user via the GUI module 125 the options available for controlling the device 110 in step 305 and to receive an input in step 306 from the user via the input interface module 126. In step 307 the software GUI component interprets the received input and generates a command for the controllable component. The command is sent in step 308 and received in step 309 at the controllable device 110. Next, it is passed from the external controller manager 112 to the controllable device 114 for execution.

[0040] Moreover, in step 311, the controllable component 114 may send its operational parameters to the software GUI component operating at the controller 120 in order to allow the component to communicate these parameters to the user via the GUI 125.

[0041] The present invention is related to a useful result of improved control of devices. This result is concrete and tangible. Therefore, the invention as described herein provides a useful, concrete and tangible result.

[0042] Further, the invention is applied in particular controllable devices, such as audio players, television set-top boxes, washing machines, coffee makers, light controllers etc, and in particular external controllers, such as smartphones, smartwatches, tablets etc, meaning that the idea underlying the invention is not abstract and is applied in particular improved machines. Thus the machine or transformation test is fulfilled.

[0043] It can be easily recognized, by one skilled in the art, that the aforementioned system and method may be performed and/or controlled by one or more computer programs. Such computer programs are typically executed by utilizing the computing resources of a processing unit which can be embedded within various graphic processing computer systems, such as personal computers, personal digital assistants, cellular telephones, receivers and decoders of digital television, video display units or the like. The computer programs can be stored in a non-volatile memory, for example a flash memory or in a volatile memory, for example RAM and are executed by the processing unit. These memories are exemplary recording media for storing computer programs comprising computer-executable instructions performing all the steps of the computer-implemented method according to the technical concept presented herein.

[0044] While the system and method presented herein has been depicted, described, and has been defined with reference to particular preferred embodiments, such references and examples of implementation in the foregoing specification do not imply any limitation on the invention. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader scope of the technical concept. The presented preferred embodiments are exemplary only, and are not exhaustive of the scope of the technical concept presented herein. Accordingly, the scope of protection is not

limited to the preferred embodiments described in the specification, but is only limited by the claims that follow.

5 Claims

1. A controllable device (110) comprising at least one controllable component (114), **characterized in that** the controllable device (110) comprises:

- memory (113) storing a software GUI (Graphical User Interface) component configured to provide a graphical user interface for operating the controllable component (114) by commands generated in response to user navigation actions;
- a communication interface (111) configured to communicate with an external controller (120) having a GUI module (125) and an input interface (126); and
- an external controller manager (112) configured to communicate, via the communication interface (111), with the external controller (120) to:

- send the software GUI component from the memory (113) to the external controller (120);
- receive from the external controller (120) commands; and
- send the received commands to the controllable component (114).

2. The controllable device according to claim 1, wherein the memory (113) stores a plurality of software GUI components.

3. The controllable device according to claim 1, wherein the memory (113) stores a link to a software GUI component at a remote location.

4. A system for remote control, **characterized in that** the system comprises:

- the controllable device (110) according to any of claims 1-3,
- the external controller (120) comprising:

- a communication interface (121) configured to communicate with the controllable device (110),
- a memory (123) for storing the software GUI component;
- the GUI module (125);
- the input interface module (126);
- a processor (124) configured to operate the software GUI component to allow the user to navigate the software GUI compo-

- nent using the GUI module (125) and the input interface module (126) such as to allow the user to input navigation actions and to allow the software GUI component to generate commands in response to the input navigation actions; and
 - a controllable device manager (122) configured to communicate, via the communication interface (121), with the controllable device (110) to:
- receive the software controlling component from the controllable device (110) and store it in the memory (123);
 - receive commands from the processor (124) operating the software controlling component; and
 - send the received commands to the controllable device (110).
- 5 **9.** The method according to any of claims 6-8, wherein the software GUI component is sent from the controllable device to the external controller after receiving input demand from user.
- 10 **10.** The method according to any of claims 6-8, wherein the software GUI component is sent from the controllable device to the external controller automatically after initiation of the communication.
- 15 **11.** A computer program comprising program code means for performing all the steps of the method according to any of claims 6-10 when said program is run on a computer.
- 20 **12.** A computer readable medium storing computer-executable instructions performing all the steps of the method according to any of claims 6-10 when executed on a computer.
- 5.** The system according to claim 4, wherein the external controller (120) comprises memory configured to store a plurality of software GUI components.
- 6.** A method for remote control of a controllable device (110) via an external controller (120), **characterized in that** it comprises the steps of:
- initiating (301, 302) communication between the controllable device (110) and the external controller (120);
 - sending (303) a software GUI (Graphical User Interface) component from the controllable device (110) to the external controller (120);
 - receiving (309) at the controllable device (110) a command from the external controller (120);
 - sending (310) at the controllable device (110) the received command to a controllable component (114) of the controllable device (110).
- 7.** The method according to claim 6, further comprising the following steps performed at the external controller:
- receiving (304) and storing the software GUI component in a memory (123);
 - executing (305) the software GUI component to display the GUI via a GUI module (125);
 - receiving (306) an input navigation action from user via an input interface module (126);
 - generating (307) a command in response to the input navigation action; and
 - sending (308) the command to the controllable device.
- 8.** The method according to any of claims 6-7, further comprising the step of sending (311) operational parameters of the controllable component (114) to the

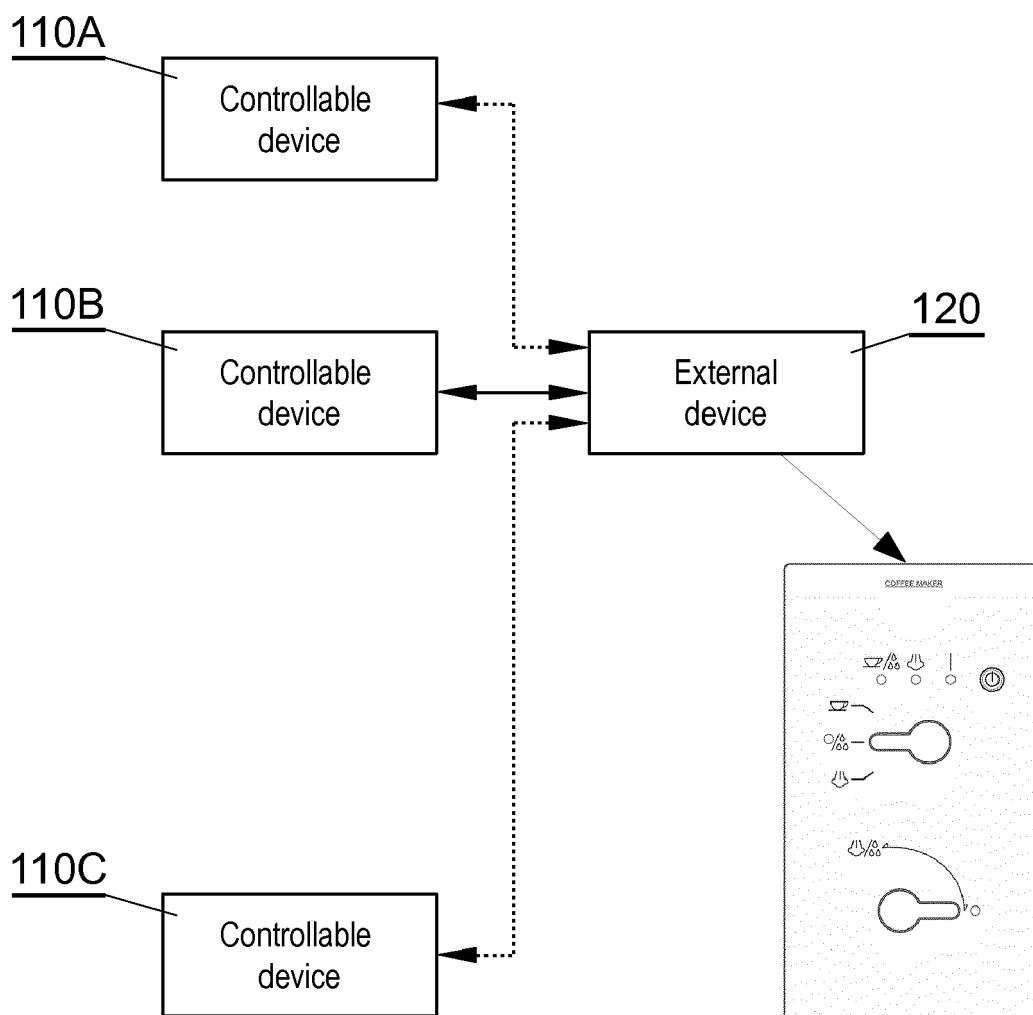


Fig. 1

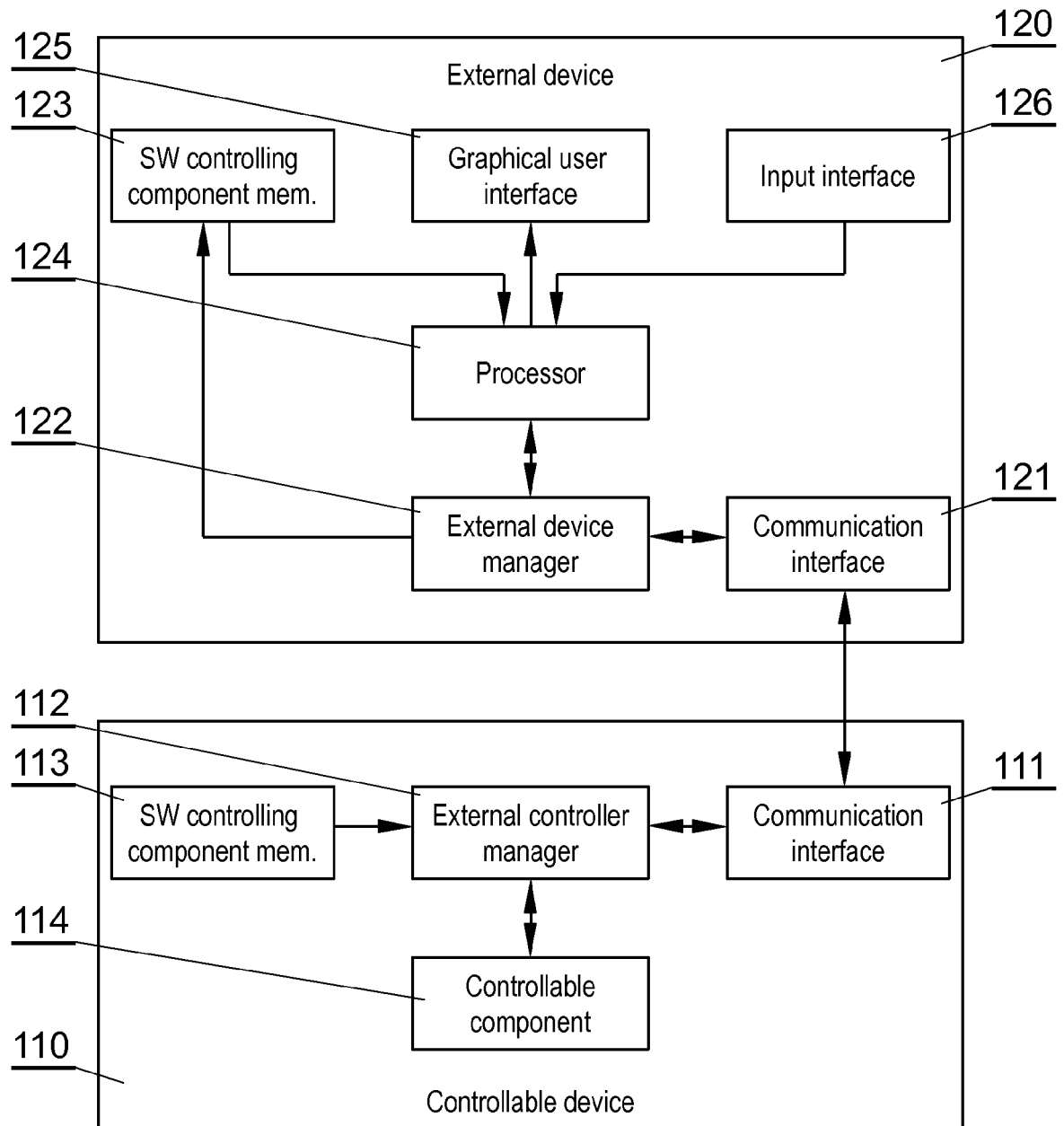


Fig. 2

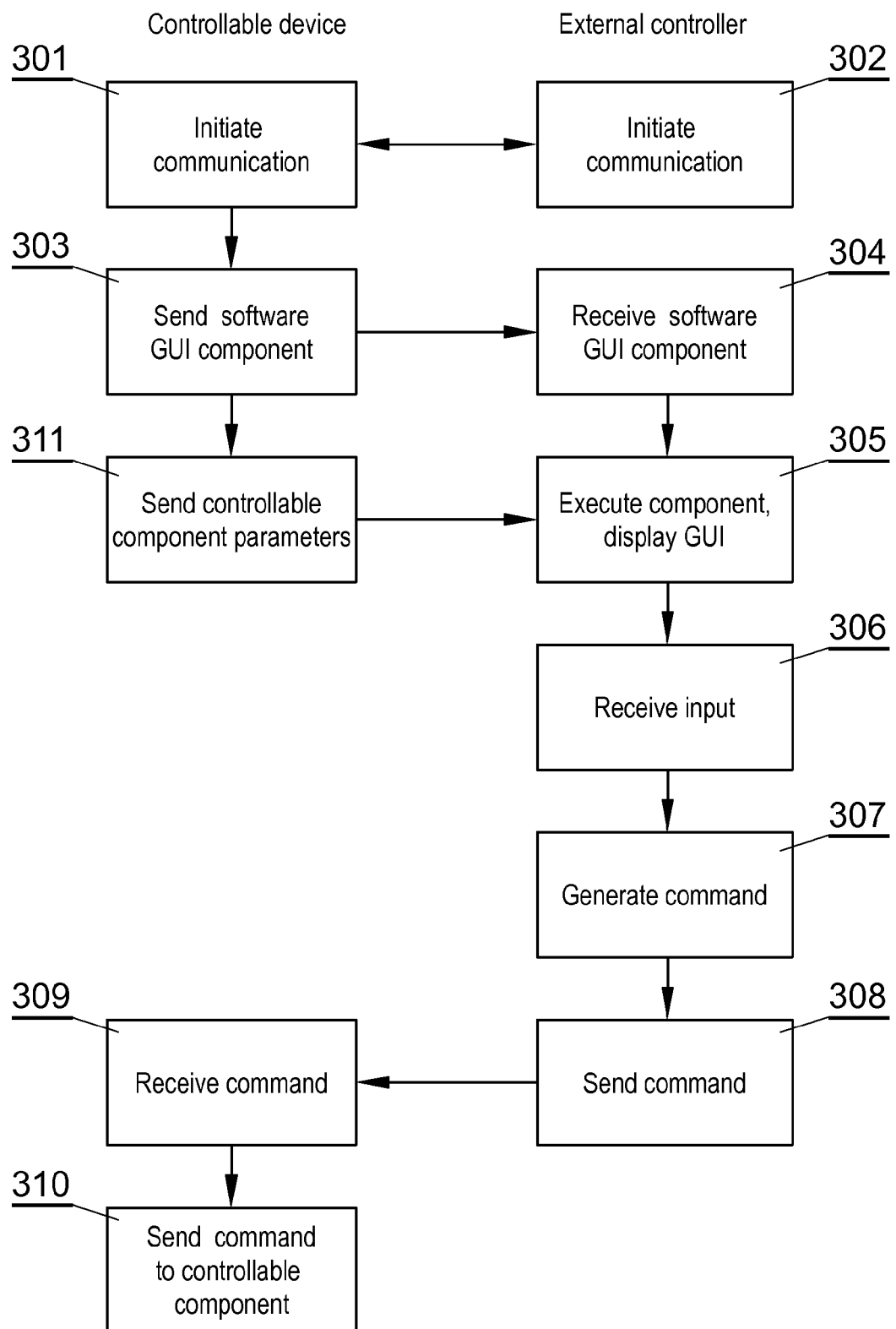


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 19 3457

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
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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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 14 19 3457

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
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