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(54) **REMOTE CONTROL DEVICE AND REMOTE CONTROL METHOD**

(57) The present invention provides a remote control device (100, 200, 300) for controlling a number of electronic devices, the remote control device (100, 200, 300) comprising a plurality of vertically movable input pixel elements (101, 201, 301), and a control unit (102) coupled to the input pixel elements (101, 201, 301) and configured to control respective ones of the input pixel elements (101, 201, 301) that pertain to a predetermined

input pattern (103, 203, 303) to vertically elevate in a control mode and to retract in a passive mode, wherein in the control mode the control unit (102) is further configured to detect user input (113) on the elevated input pixel elements (101, 201, 301) and to perform a respective control of the electronic devices. Further, the present invention provides a respective remote control method.

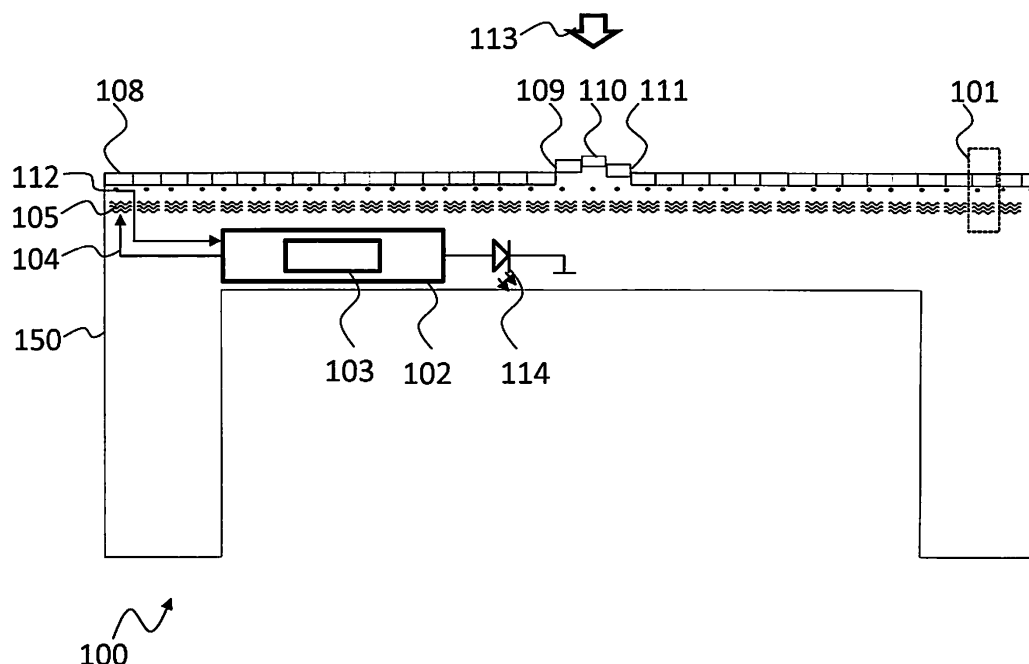


Fig. 1

Description**TECHNICAL FIELD**

5 [0001] The invention relates to a remote control device for controlling a number of electronic devices.

BACKGROUND

10 [0002] Although applicable to any electronic system, the present invention will mainly be described in conjunction with remote controlling multi-media devices, like e.g. TV sets.

[0003] Modern multi-media installations may comprise a plurality of electronic devices, like e.g. a TV set, a set-top box, a DVD player, a streaming unit, a cable or satellite receiver and the like.

15 [0004] Usually every device will be provided with a dedicated remote control. This leads to confusion of the users and single remotes may be lost. To reduce the number of remote controls in such electronic installations, universal remote controls have been developed. Such universal remote controls may be configured to control different electronic devices and may further learn control codes of the different devices.

[0005] However, such a universal remote control, although reducing the number of remote controls, may still be lost.

[0006] Accordingly, there is a need for providing an improved solution for remotely controlling electronic devices.

20 **SUMMARY OF THE INVENTION**

[0007] The present invention provides a remote control device with the features of claim 1 and a remote control method with the features of claim 12.

[0008] Accordingly, it is provided:

25 A remote control device for controlling a number, i.e. one or more or a plurality, of electronic devices, the remote control device comprising a plurality of vertically movable input pixel elements, and a control unit coupled to the input pixel elements and configured to control respective ones of the input pixel elements that pertain to a predetermined input pattern to vertically elevate in a control mode and to retract in a passive mode, wherein in the control
30 mode the control unit is further configured to detect user input on the elevated input pixel elements and to perform a respective control of the electronic devices.

[0009] Further, it is provided:

35 A remote control method for controlling a number of electronic devices, the remote control method comprising vertically elevating vertically movable input pixel elements that pertain to a predetermined input pattern and form part of a plurality of vertically movable input pixel elements, detecting user input on the elevated input pixel elements, and performing control of the electronic devices based on the detected user input.

40 [0010] The present invention is based on the finding that common remote control devices for electronic devices are uncomfortable because one remote control is required for every device, a universal remote control has to be configured for every device or because they are easily lost.

45 [0011] The present invention therefore provides the remote control device that may be integrated into any type of flat surface, like e.g. a table surface or a side surface of a couch or shelf. This allows providing a table, e.g. in a living room, that at the same time may operate as a remote control device. It is understood, that the remote control device of the present invention may e.g. be provided only in a specific section of such a surface, i.e. the surface of the remote control device is smaller than the respective surface, e.g. the surface of the table.

50 [0012] To provide the remote control capability, the remote control device provides users with input elements. However, in contrast to common remote controls, the input elements of the present invention are dynamically formed on demand by the vertically movable input pixel elements. The vertically movable input pixel elements may be seen as single pixels of the surface of the remote control device that may individually be elevated and retracted.

55 [0013] The control unit may therefore in a control mode recreate respective input patterns by controlling the respective input pixel elements. The input pattern may e.g. comprise a binary pattern, where a "1" indicates an elevated input pixel element and a "0" indicates a retracted input pixel element. The input patterns may therefore be seen as a kind of black-and-white image of the surface of a remote control device. Different input sections may therefore be created by elevating fields of input pixel elements. It is understood, that at least one input pattern may be provided in the control unit. However, more than one input pattern may also be provided, e.g. for selection by the user.

[0014] In the control mode, the control unit further monitors the recreated input pattern for any user interaction and

controls an electronic device accordingly. User interaction may refer to a user pressing down at least one of the elevated input pixel elements. To this end, single ones of the elevated input pixel elements or groups of the elevated input pixel elements may be monitored for a downwards movement to detect the user input. Every one of the elevated input pixel elements or groups of elevated input pixel elements may be assigned a respective control function. Therefore, the control unit may perform the respective control function to control the respective electronic device, e.g. by emitting a corresponding command to the electronic device.

[0015] In contrast to the control mode, the control unit may retract all input pixel elements in a passive mode. In the passive mode, no control of any electronic device is performed by the remote control device.

[0016] With the present invention it is therefore possible to control a plurality of different electronic devices with a single remote control device. In addition, the remote control device may be integrated into any surface, like e.g. a table surface and can therefore not get lost.

[0017] Further embodiments of the present invention are subject of the further subclaims and of the following description, referring to the drawings.

[0018] In an embodiment, the input pixel elements may comprise magnetic actuators arranged under a ferromagnetic cap. Further, the control unit may be coupled to the magnetic actuators and may be configured to control the magnetic actuators to elevate the respective magnetic caps.

[0019] Electromagnetic actuators may e.g. be provided in the form of discrete wire coils or in the form of integrated coils that may e.g. be provided as traces on a printed circuit board. Using electromagnetic actuators provides for a mechanically very simple arrangement that allows individually elevating single input pixel elements. The ferromagnetic caps may e.g. be provided in a sliding mechanism, e.g. with respective guides. Driving an electric current through the magnetic actuators will then create a magnetic field that in turn applies a magnetic force to the ferromagnetic caps. The magnetic force then elevates the ferromagnetic caps.

[0020] The control unit may e.g. comprise a dedicated switching element for every one of the input pixel elements. It is further possible to control the elevation altitude of the single input pixel elements by modulating the driving current of the respective magnetic actuators, e.g. via a PWM modulation of the driving current.

[0021] The electromagnetic actuators may further be used to detect user input, e.g. a downward movement of the input pixel elements. The control unit may e.g. measure or determine the inductance of the single electromagnetic actuators, e.g. by applying signals with specific frequencies or frequency patterns and analyzing the response of the electromagnetic actuator. A respective change of the inductance may then be used to detect the user input.

[0022] In another embodiment, the input pixel elements may each comprise a pixel cap and a motor actuator coupled to the respective pixel cap. Further, the control unit may be coupled to the motor actuators and may be configured to control the motor actuators to elevate the respective pixel caps.

[0023] The motor actuators may e.g. comprise electric motors like e.g. miniature servo motors, linear motors or rotational motors. If rotational motors are used, a mechanical arrangement e.g. with levers and hinges may be used to translate a rotation into the lifting movement for the input pixel elements.

[0024] Further possible actuators for elevating the single input pixel elements may e.g. comprise ultrasonic actuators, pneumatic actuators and the like.

[0025] In a further embodiment, the remote control device may comprise actuation sensors arranged under the input pixel elements and configured to monitor the input pixel elements for actuation by a user and to provide respective actuation signals. In addition, the control unit may be coupled to the actuation sensors and may be configured to detect the user input based on the actuation signals.

[0026] The actuation sensors may comprise single, dedicated actuation sensing elements or a spatially extended sensor device, like e.g. a sensor mat or the like. The actuation sensors may comprise a sensing technology that is capable of detecting the user's hand or finger, i.e. the user's skin, through the input pixel elements. As alternative, the actuation sensors may be sensors that may detect movement of the input pixel elements. A downward movement of an elevated input pixel element may then e.g. be interpreted as a respective user input.

[0027] In an embodiment, the actuation sensors may comprise hall-effect based sensors and/or capacitive sensors. In addition or as alternative, the actuation sensors may comprise a dedicated sensing element for every one of the input pixel elements.

[0028] With the actuation sensors it is possible to detect the user input independently of the actuator technology that is used to elevate the input pixel elements.

[0029] Hall-effect and capacitive sensors are contactless sensors that may sense the user actuation through the input pixel elements.

[0030] In another embodiment, the control unit may be configured to select the input pattern based on a user selection of the electronic device to be controlled.

[0031] As explained above, different electronic devices may be controlled with the remote control device. Further, the different electronic devices may require different input elements. For example a TV set may require a volume up/down input element, while a DVD player may require a forward/backward input element.

[0032] Therefore, different input patterns may be provided for the different electronic devices. Every input pattern may e.g. define specific input fields. As explained above, the input fields may comprise groups of input pixel elements or single ones of the input pixel elements. Further, the input pattern may define for every input field a respective control function. The control functions define which type of control, i.e. which function, is controlled in the respective electronic device. Exemplary control functions may e.g. comprise an "increase volume", a "decrease volume", an "increase channel", a "decrease channel", a single number input function, or the like.

[0033] If the control unit detects a user input on an input field that for example is provided for the "increase volume" function, the control unit will then emit the respective control command to the electronic device and the respective function will be performed in the electronic device.

[0034] The user selection may e.g. be performed via dedicated switches or buttons. As alternative or in addition, respective selection fields may be created with the input pixel elements. Further, different locations of the surface formed by the input pixel elements may be reserved for different electronic devices. If the user's hand is detected over one of the reserved locations, the respective input pattern may be generated by the control unit. It is understood, that the locations may be defined as areas on the surface.

[0035] In an embodiment, the remote control device may comprise a control signal output device coupled to the control unit. Further, the control unit may be configured to control the electronic devices via the control signal output device.

[0036] The control signal output device serves to transmit control signals to the electronic devices. The control signals are generated based on the detected user input and initiate a respective function execution in the electronic device. The functions may be the same functions that may e.g. be performed with the original remote control of the respective electronic device.

[0037] The control signal output device may e.g. comprise respective signal generation logic that generates the respective signals. The control unit may e.g. simply provide the control signal output device with an information about the required function and the control signal output device performs all signal generation, i.e. signal content creation, signal modulation, etc.

[0038] As alternative, the control signal output device may be provided by the control unit with a signal that only has to be transmitted to the respective electronic device. In this case, the control unit performs at least the signal content creation.

[0039] The transmission of the respective control signal may be performed by the control signal output device via an optical signal transmission channel, a wired signal transmission channel, a wireless signal transmission channel or the like.

[0040] In another embodiment, the control signal output device may comprise an infrared emitter and/or a Bluetooth transceiver and/or a WIFI transceiver and/or an Ethernet transceiver.

[0041] Infrared control of electronic devices is the most common type of control. Therefore, using an infrared emitter allows controlling most of the available electronic devices. Especially modern electronic devices may sometimes also be controlled via Bluetooth or network signals, like WIFI or Ethernet signals.

[0042] Providing control signals via WIFI or Ethernet networks further allows controlling e.g. home automation systems or the like with the remote control device.

[0043] It is understood, that any other communication method may also be used. For example an EnOcean transceiver, a ZigBee transceiver or a Z-Wave transceiver may be provided.

[0044] In an embodiment, the control unit may be configured to create buttons, or input fields, of the input pattern by elevating the respective input pixel elements, and wherein the control unit is especially configured to create functional information for the buttons by elevating respective input pixel elements in the surface of the button over the further input pixel elements of the surface of the button.

[0045] The functional information may be created using the input pixel elements themselves. To this end, groups of input pixel elements may be elevated to form input field or buttons. Inside of these groups, some input pixel elements may be elevated more than the other input pixel elements to form the functional information. The number of input pixel elements of the respective field determines the resolution of the image that may be created for the functional information.

[0046] In a further embodiment, the remote control device may comprise a display device on the top surface of a number, i.e. one or more or a plurality, of the input pixel elements, wherein the control unit is coupled to the display devices and is configured to display functional information on the display devices.

[0047] Without the display devices, the remote control device may recreate input patterns by elevating the respective input pixel elements, as explained above. However, with the display devices on top of at least some of the input pixel elements, it is possible to provide further information about the function of the respective field or element to a user.

[0048] The functional information that the control unit displays on the display devices may e.g. indicate the respective function. For example arrows may be provided for channel switching functions or volume control functions. The functional information may also comprise text elements, like e.g. Vol+, Vol-, Ch+, Ch- or the like.

[0049] With the display devices it is therefore possible to provide an additional aid to the users for identifying the single fields and the respective functions of the respective input pattern.

[0050] In an embodiment, the remote control device may comprise a proximity sensor configured to sense the position

of a user's hand over the remote control device. The control unit may be coupled to the proximity sensor and may be configured to select the center point for the input pattern based on a sensed position of a user's hand over the remote control device.

[0051] The surface that is covered by the input pixel elements may e.g. be the surface of a table. This means that the surface may be larger than required for a specific input pattern. Knowing the position of the user's hand allows the control unit to move the position of the recreated input pattern on the surface of the table accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052] For a more complete understanding of the present invention and advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings. The invention is explained in more detail below using exemplary embodiments which are specified in the schematic figures of the drawings, in which:

Fig. 1 shows a block diagram of an embodiment of a remote control device according to the present invention;

Fig. 2 shows a block diagram of another embodiment of a remote control device according to the present invention;

Fig. 3 shows a block diagram of another embodiment of a remote control device according to the present invention; and

Fig. 4 shows a block diagram of an embodiment of a remote control method according to the present invention.

[0053] In the figures like reference signs denote like elements unless stated otherwise.

DETAILED DESCRIPTION OF THE DRAWINGS

[0054] Fig. 1 shows a block diagram of a remote control device 100 in a side view. The remote control device 100 may e.g. be used to control electronic devices like e.g. TV sets, video receivers, DVD players and the like.

[0055] The remote control device 100 comprises a plurality of vertically movable input pixel elements 101, of which only one is provided with a reference sign for sake of clarity. Every one of the input pixel elements 101 comprises a magnetic actuator 105, a ferromagnetic cap 108 and an actuation sensor 112. Again, for sake of clarity only one magnetic actuator 105, one ferromagnetic cap 108 and one actuation sensor 112 are provided with reference signs. In a top view (see e.g. Fig. 2) the input pixel elements 101 may be arranged in a square shape, i.e. in a matrix, where the input pixel elements 101 are provided in rows and columns.

[0056] The magnetic actuators 105 and the actuation sensors 112 are coupled to a control unit 102. The control unit 102 comprises at least one input pattern 103. Input patterns 103 may e.g. be stored in a memory (not explicitly shown) of the control unit 102.

[0057] The control unit 102 may control the single magnetic actuators 105 via respective control signals 104 to elevate the ferromagnetic caps 108 according to the input pattern 103. The control signal 104 may e.g. comprise a constant current or a modulated current. The current may e.g. be PWM modulated by the control unit 102. By modulating the control signal 104, the control unit 102 may control the elevation height for the ferromagnetic caps 108. This may e.g. be used to create functional information for single input fields of the input pattern 103, as will be described in conjunction with Fig. 3. Just as an example, in Fig. 1 the caps 109, 110, 111 are elevated to demonstrate how the input fields or input buttons may be created by the control unit 102.

[0058] The control unit 102 further monitors via the actuation sensors 112 any user input 113 that a user may perform on the fields or buttons of the input pattern 103. If a user presses down one of the respective caps 109, 110, 111, the control unit 102 controls the respective electronic device accordingly. In the remote control device 100 an infrared diode 114 is provided as control signal output device. The control unit 102 may therefore create infrared signals that control the respective electronic device according to the detected user input 113. Such infrared signals may e.g. be encoded according to the RC-5 code or any other code that may serve to control an electronic device. It is understood, that any other type of signal transmission may be used to control the electronic devices.

[0059] The remote control device 100 is installed in a table 150 and the input pixel elements 101 form the surface of the table 150. It is understood, that the input pixel elements 101 may also be limited to a specific region of the surface of the table 150.

[0060] Although magnetic actuators 105 are shown in Fig. 1, it is understood, that any other type of actuators is also possible. For example, electric motors, pneumatic actuators and the like are possible.

[0061] It is further understood, that the control unit 102 may e.g. comprise a controller, a microcontroller, a processor or the like and that the function of the control unit 102 may be provided by hardware, software or a combination of both.

For example a firmware may be provided on a microcontroller that performs the above described functions with the hardware of the processor.

[0062] Fig. 2 shows a block diagram of a remote control device 200. The remote control device 200 is based on the remote control device 100 and is shown in a perspective view. In Fig. 2 the matrix alignment of the input pixel elements 201 in rows and columns can be seen.

[0063] Further, on the left section of the surface of the remote control device 200 an input pattern 203 is shown with cross striped input pixel elements 201. It is understood, that the input pattern 203 is just exemplarily shown and that any other input pattern is possible. Further, different input patterns or an input pattern with separate fields may be provided.

[0064] Although not explicitly shown, the input pixel elements 201 or at least some of them may comprise display elements on their top surface, e.g. on the top of the respective caps. The control unit may be coupled to the display elements and provide functional information for the single input pixel elements 201 that correspond to a function in the control pattern 203. Depending on the size of the input pixel elements 201 a single input pixel element 201 with a display device may be used for every control function.

[0065] In Fig. 2 a single input pattern 203 is shown. It is however also possible to create different input patterns on the surface of the table 250. For example, on a stripe on any of the edges of the surface a selection input pattern may be generated that allows to select the electronic device that is to be controlled. As alternative, different input patterns for different electronic devices may be provided on different sections of the surface of the table.

[0066] Fig. 3 shows a block diagram of a remote control device 300. In Fig. 3 only a single input field of a control pattern 303 is shown to demonstrate, how different heights of the input pixel elements 301 may be used to visualize the functional information. The elevated input pixel elements 301 form the numeral "1" and may e.g. be used to indicate a channel number input field. It is understood, that any other numeral or pictogram may be created with the same principle.

[0067] The control pattern 303 may e.g. comprise a square shaped input field that consists of the respective number of input pixel elements 301. The functional information, in this case the numeral "1" may consist of input pixel elements 301 that are further elevated with respect to the other input pixel elements 301 of the input field. As alternative, the input field may only consist of the input pixel elements 301 that form the numeral "1".

[0068] For sake of clarity in the following description of the method based Fig. 4 the reference signs used above in the description of apparatus based Figs. 1 - 3 will be maintained.

[0069] Fig. 4 shows a block diagram of a remote control method for controlling a number of electronic devices.

[0070] The remote control method comprises vertically elevating S1 vertically movable input pixel elements 101, 201, 301 that pertain to a predetermined input pattern 103, 203, 303 and form part of a plurality of vertically movable input pixel elements 101, 201, 301, detecting S2 user input 113 on the elevated input pixel elements 101, 201, 301, and performing S3 control of the electronic devices based on the detected user input 113.

[0071] Vertically elevating S1 may e.g. comprise controlling magnetic actuators 105 to elevate the respective magnetic caps 108, 109, 110, 111 and/or controlling motor actuators to elevate respective pixel caps.

[0072] The remote control method may further comprise selecting the input pattern 103, 203, 303 based on a user selection of the electronic device to be controlled. In addition or as alternative, the electronic devices may e.g. be controlled via a control signal output device 114, especially via an infrared emitter and/or a Bluetooth transceiver and/or a WIFI transceiver and/or an Ethernet transceiver.

[0073] The remote control method may further comprise creating buttons of the predetermined input pattern 103, 203, 303 by elevating the respective input pixel elements 101, 201, 301. Functional information for the buttons may be created by elevating respective input pixel elements 101, 201, 301 in the surface of the button over the further input pixel elements 101, 201, 301 of the surface of the button, or by displaying functional information on the display devices.

[0074] The remote control method may further comprise sensing the position of a user's hand and selecting the center point for the input pattern 103, 203, 303 based on a sensed position of a user's hand.

[0075] Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that a variety of alternate and/or equivalent implementations exist. It should be appreciated that the exemplary embodiment or exemplary embodiments are only examples, and are not intended to limit the scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing at least one exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents. Generally, this application is intended to cover any adaptations or variations of the specific embodiments discussed herein.

[0076] Thus, the present invention provides a remote control device 100, 200, 300 for controlling a number of electronic devices, the remote control device 100, 200, 300 comprising a plurality of vertically movable input pixel elements 101, 201, 301, and a control unit 102 coupled to the input pixel elements 101, 201, 301 and configured to control respective ones of the input pixel elements 101, 201, 301 that pertain to a predetermined input pattern 103, 203, 303 to vertically elevate in a control mode and to retract in a passive mode, wherein in the control mode the control unit 102 is further configured to detect user input 113 on the elevated input pixel elements 101, 201, 301 and to perform a respective

control of the electronic devices. Further, the present invention provides a respective remote control method.

List of reference signs

5 [0077]

100, 200, 300	remote control device
101, 201, 301	input pixel element
102	control unit
103, 203, 303	input pattern
104	control signal
105	magnetic actuators
108, 109, 110, 111	cap
112	actuation sensors
113	user input
114	infrared diode

150 table

20 S1, S2, S3 method steps

Claims

- 25 1. Remote control device (100, 200, 300) for controlling a number of electronic devices, the remote control device (100, 200, 300) comprising:
 - 30 a plurality of vertically movable input pixel elements (101, 201, 301), and
 - a control unit (102) coupled to the input pixel elements (101, 201, 301) and configured to control respective ones of the input pixel elements (101, 201, 301) that pertain to a predetermined input pattern (103, 203, 303) to vertically elevate in a control mode and to retract in a passive mode,
 - wherein in the control mode the control unit (102) is further configured to detect user input (113) on the elevated input pixel elements (101, 201, 301) and to perform a respective control of the electronic devices.
- 35 2. Remote control device (100, 200, 300) according to claim 1, wherein the input pixel elements (101, 201, 301) comprise magnetic actuators (105) arranged under a ferromagnetic cap (108, 109, 110, 111), wherein the control unit (102) is coupled to the magnetic actuators (105) and is configured to control the magnetic actuators (105) to elevate the respective ferromagnetic caps (108, 109, 110, 111).
- 40 3. Remote control device (100, 200, 300) according to claim 1, wherein the input pixel elements (101, 201, 301) each comprise a pixel cap and a motor actuator coupled to the respective pixel cap, wherein the control unit (102) is coupled to the motor actuators and is configured to control the motor actuators to elevate the respective pixel caps.
- 45 4. Remote control device (100, 200, 300) according to any one of the preceding claims, comprising actuation sensors (112) arranged under the input pixel elements (101, 201, 301) and configured to monitor the input pixel elements (101, 201, 301) for actuation by a user and to provide respective actuation signals, wherein the control unit (102) is coupled to the actuation sensors (112) and is configured to detect the user input (113) based on the actuation signals.
- 50 5. Remote control device (100, 200, 300) according to claim 4, wherein the actuation sensors (112) comprise hall-effect based sensors and/or capacitive sensors, and/or wherein the actuation sensors (112) comprise a dedicated sensing element for every one of the input pixel elements (101, 201, 301).
- 55 6. Remote control device (100, 200, 300) according to any one of the preceding claims, wherein the control unit (102) is configured to select the input pattern (103, 203, 303) based on a user selection of the electronic device to be controlled.
7. Remote control device (100, 200, 300) according to any one of the preceding claims, comprising a control signal

output device (114) coupled to the control unit (102), wherein the control unit (102) is configured to control the electronic devices via the control signal output device (114).

8. Remote control device (100, 200, 300) according to claim 7, wherein the control signal output device (114) comprises an infrared emitter and/or a Bluetooth transceiver and/or a WIFI transceiver and/or an Ethernet transceiver.

9. Remote control device (100, 200, 300) according to any one of the preceding claims, wherein the control unit (102) is configured to create buttons of the input pattern (103, 203, 303) by elevating the respective input pixel elements (101, 201, 301), and wherein the control unit (102) is especially configured to create functional information for the buttons by elevating respective input pixel elements (101, 201, 301) in the surface of the button over the further input pixel elements (101, 201, 301) of the surface of the button.

10. Remote control device (100, 200, 300) according to any one of the preceding claims, comprising a display device on the top surface of a number of the input pixel elements (101, 201, 301), wherein the control unit (102) is coupled to the display devices and is configured to display functional information on the display devices.

11. Remote control device (100, 200, 300) according to any one of the preceding claims, comprising a proximity sensor configured to sense the position of a user's hand over the remote control device (100, 200, 300), wherein the control unit (102) is coupled to the proximity sensor and is configured to select the center point for the input pattern (103, 203, 303) based on a sensed position of a user's hand over the remote control device (100, 200, 300).

12. Remote control method for controlling a number of electronic devices, the remote control method comprising:

vertically elevating (S1) vertically movable input pixel elements (101, 201, 301) that pertain to a predetermined input pattern (103, 203, 303) and form part of a plurality of vertically movable input pixel elements (101, 201, 301), detecting (S2) user input (113) on the elevated input pixel elements (101, 201, 301), and performing (S3) control of the electronic devices based on the detected user input (113).

13. Remote control method according to claim 12, wherein vertically elevating comprises controlling magnetic actuators (105) to elevate the respective magnetic caps (108, 109, 110, 111) and/or controlling motor actuators to elevate respective pixel caps.

14. Remote control method according to any one of the preceding claims 12 and 13, comprising selecting the input pattern (103, 203, 303) based on a user selection of the electronic device to be controlled; and/or comprising controlling the electronic devices via a control signal output device (114), especially via an infrared emitter and/or a Bluetooth transceiver and/or a WIFI transceiver and/or an Ethernet transceiver.

15. Remote control method according to any one of the preceding claims 12 to 14, comprising creating buttons of the predetermined input pattern (103, 203, 303) by elevating the respective input pixel elements (101, 201, 301), and especially creating functional information for the buttons by elevating respective input pixel elements (101, 201, 301) in the surface of the button over the further input pixel elements (101, 201, 301) of the surface of the button, or creating functional information by displaying functional information on the display devices; and/or comprising sensing the position of a user's hand and selecting the center point for the input pattern (103, 203, 303) based on a sensed position of a user's hand.

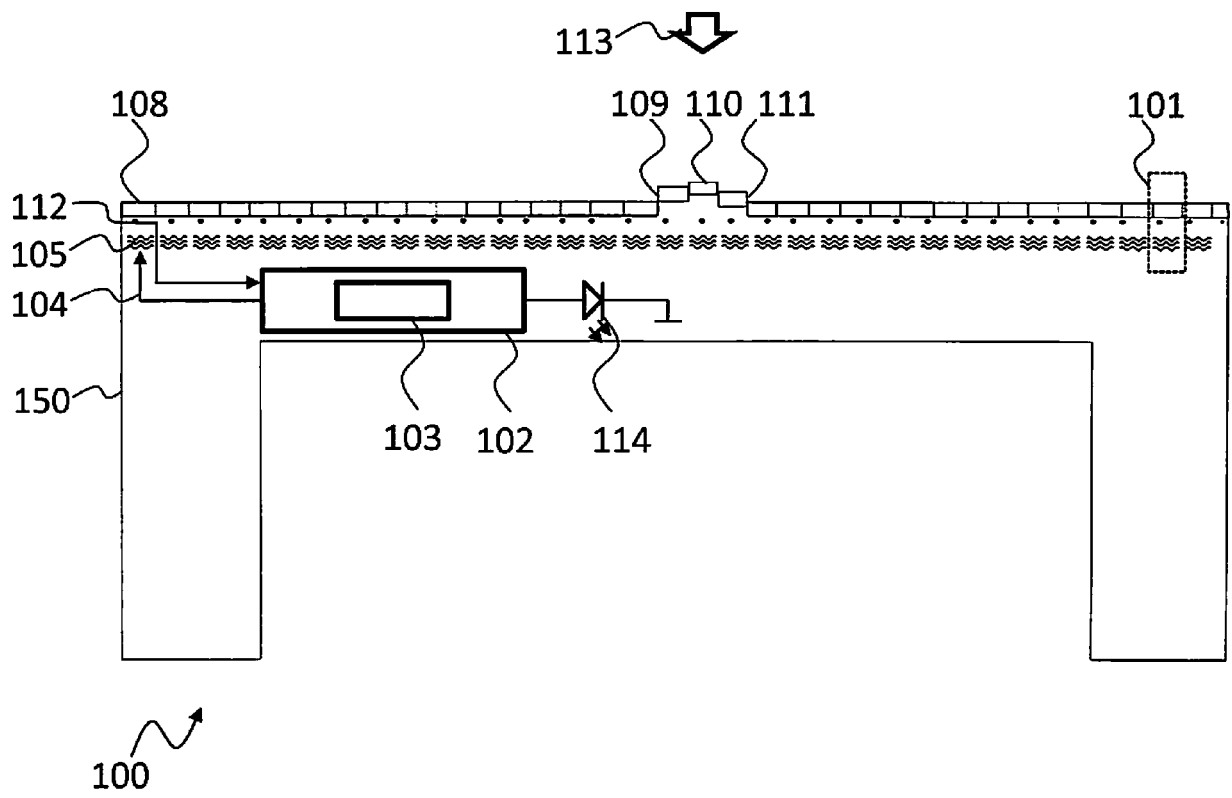


Fig. 1

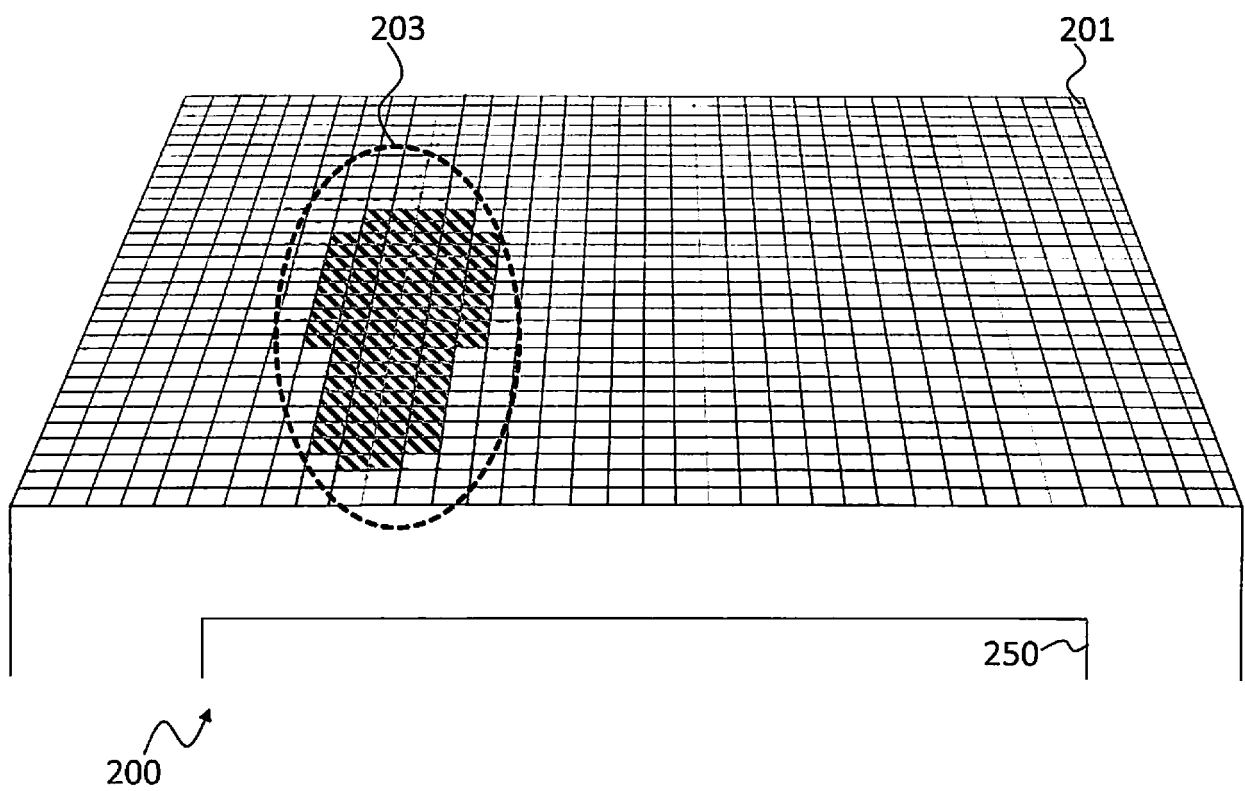
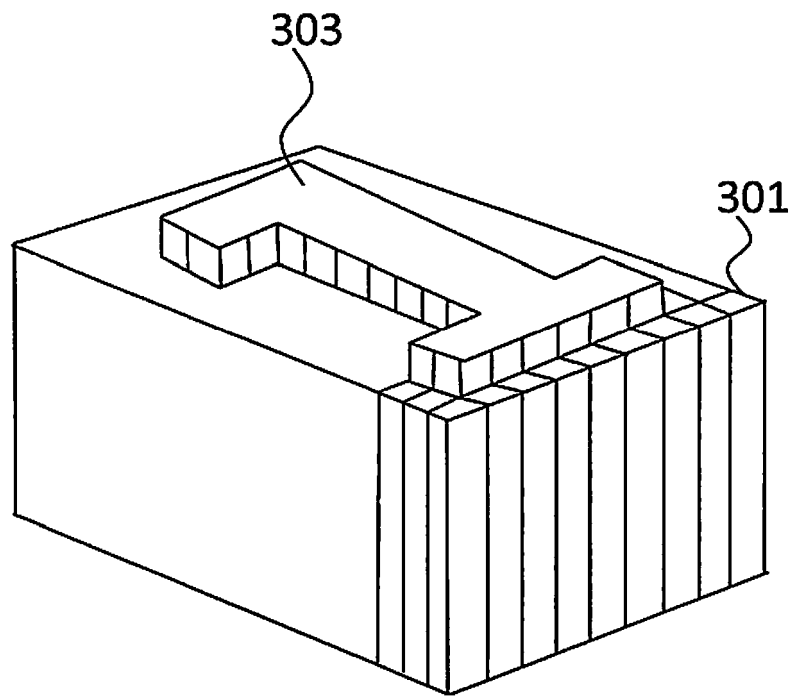


Fig. 2



300

Fig. 3

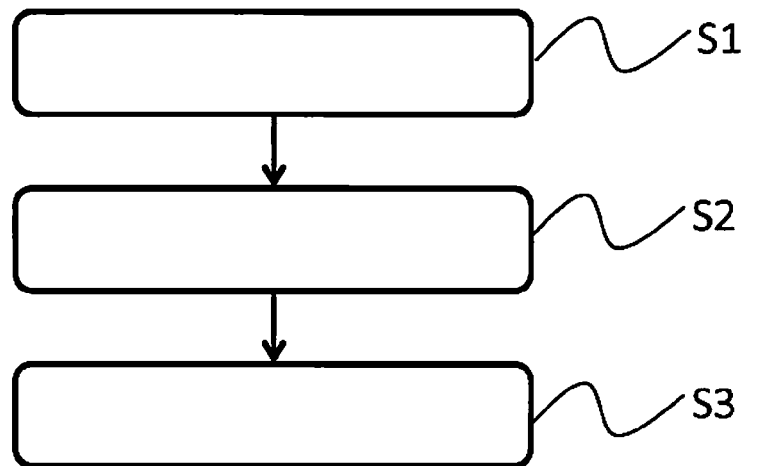


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 17 19 8822

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Place of search The Hague		Date of completion of the search 13 April 2018	Examiner Pham, Phong
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