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(54) **TACTILE REMOTE CONTROL SYSTEM**

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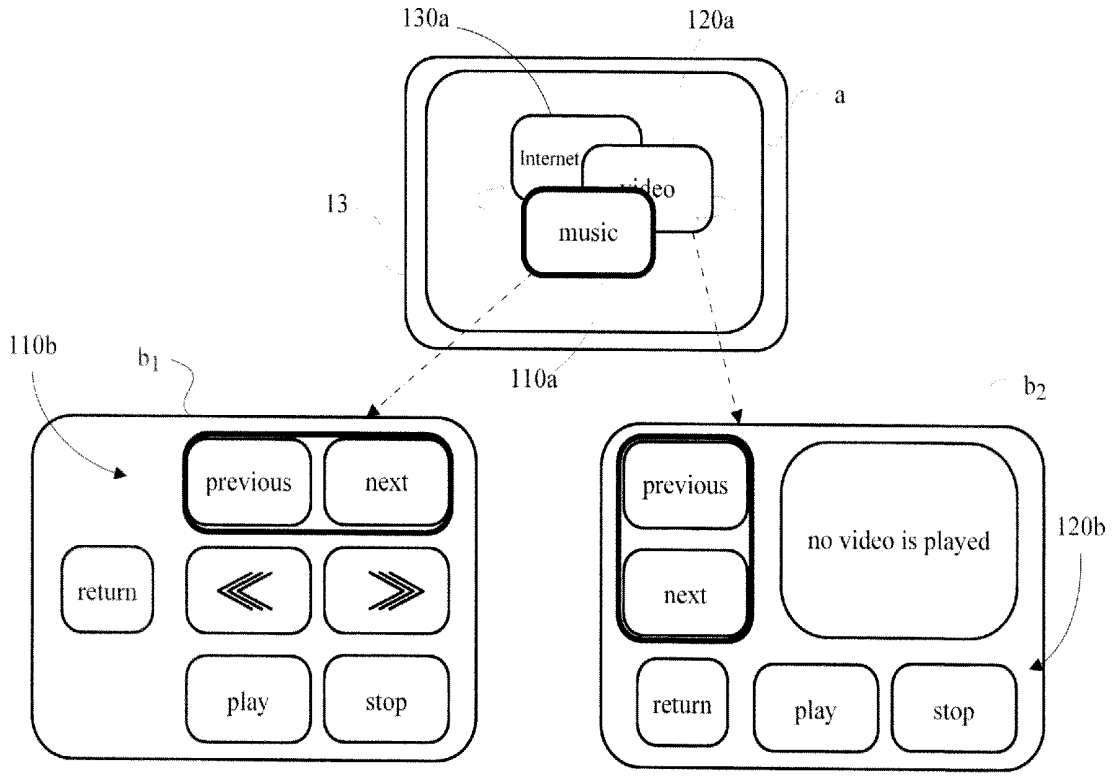
(57) **ABSTRACT**

The present invention discloses a tactile remote control system, which uses a processor to integrate the operation selection items of controlled devices and arrange the selection items into a graphic user interface, and which uses a microswitch to output instructions. The processor arranges the graphic user interfaces of a controlled device hierarchically. Therefore, the graphic user interfaces have organizationality, logicality and continuity. The user watches the display and operates the microswitches to remotely control the controlled devices. The present invention integrates the control functions to assist the user to control the daily-life electronic devices and household appliances. The present invention enables any one, who has been briefly instructed, to remotely control the linked devices by his will.



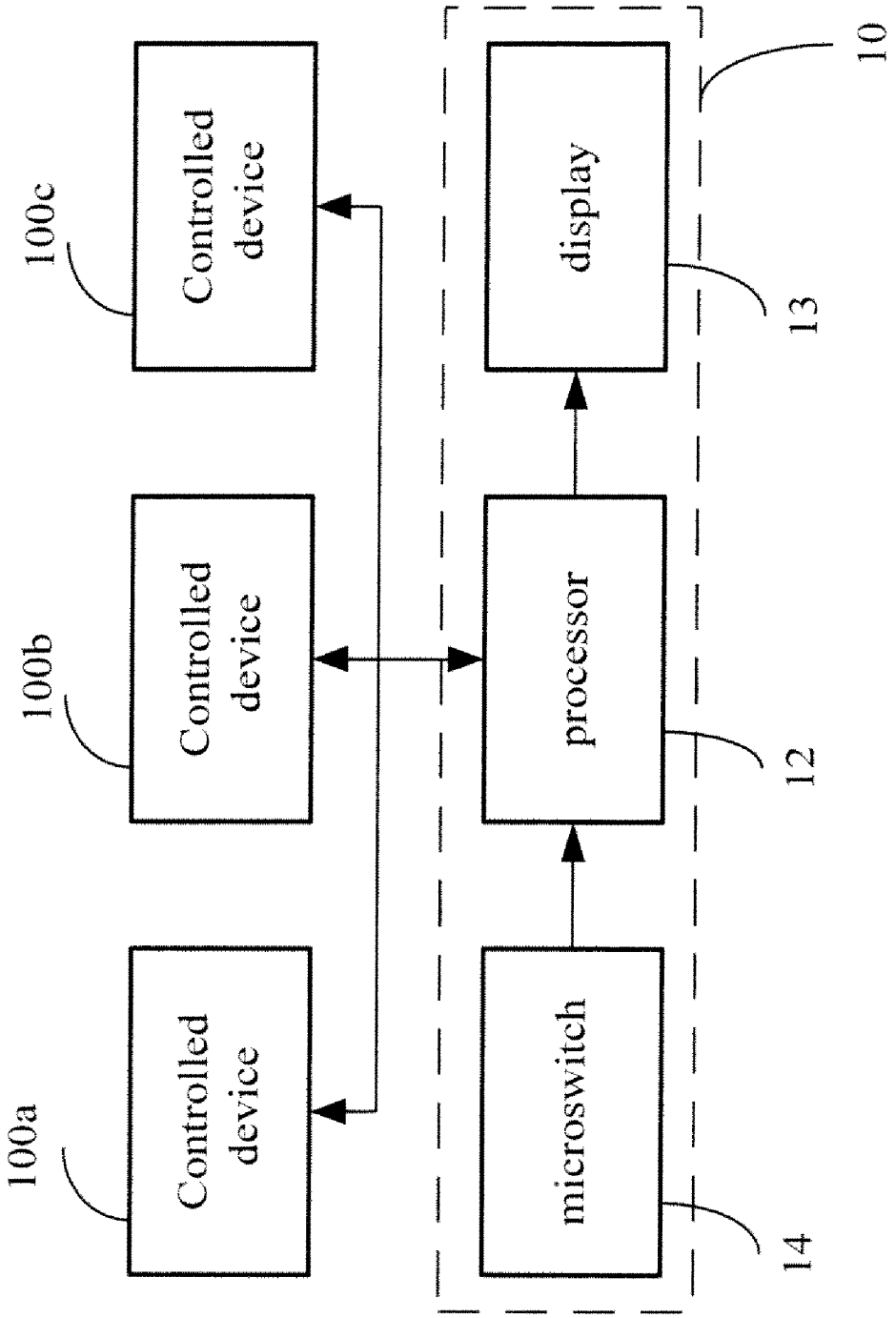

100a
Controlled device
100b
Controlled device
100c
Controlled device
microswitch
14
processor
12
display
13
10

FIG.1

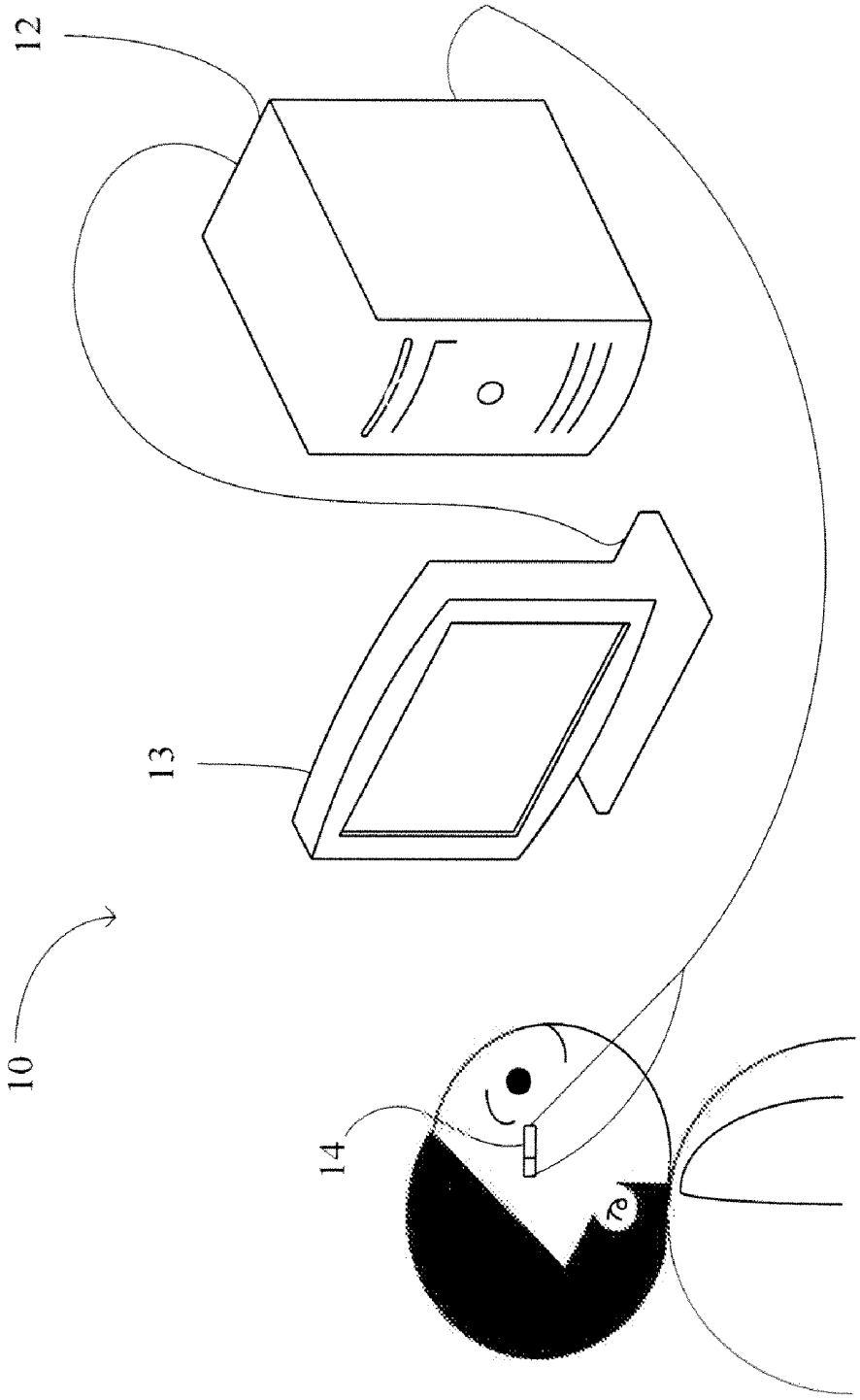


FIG.2

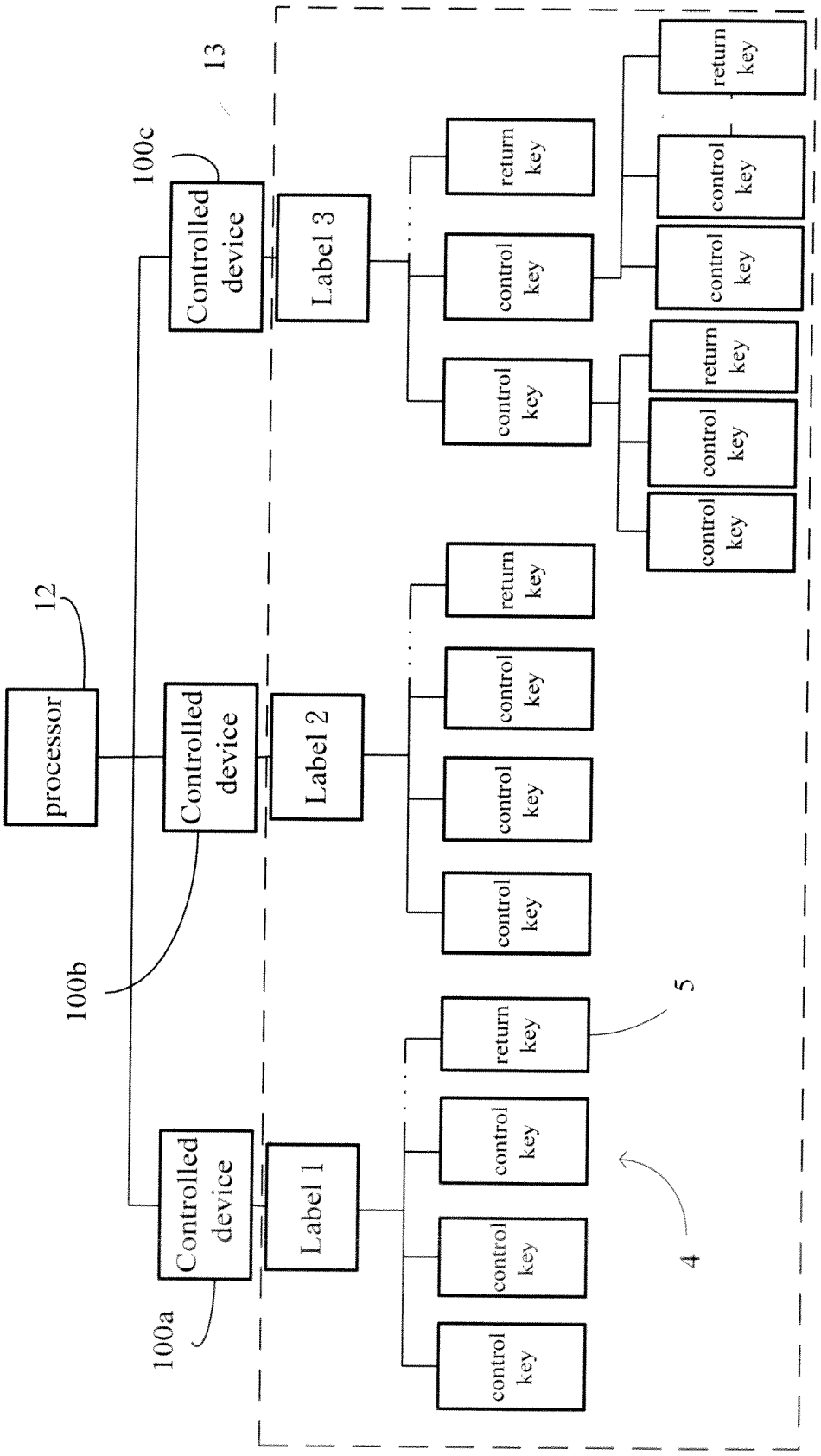

processor
12
Controlled device
100b
Label 2
control key
return key
Controlled device
100a
Label 1
Controlled device
100c
Label 3
13
4
5

FIG.3

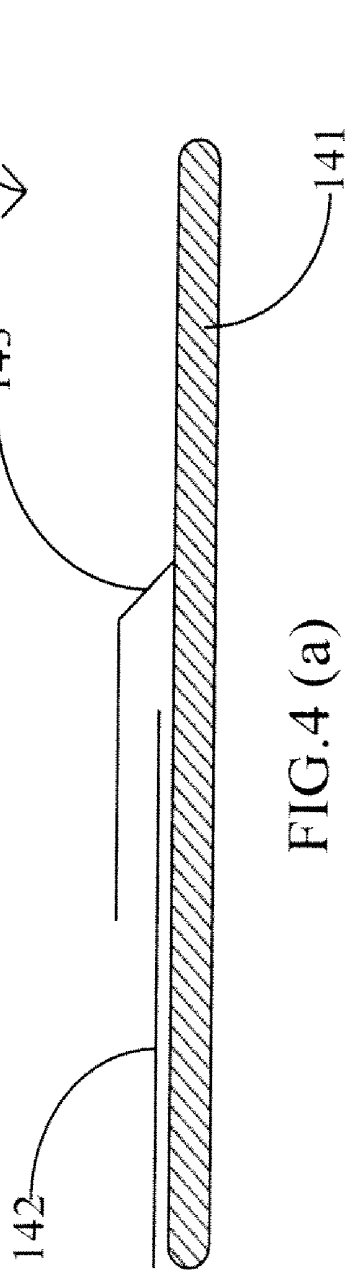


FIG.4 (a)

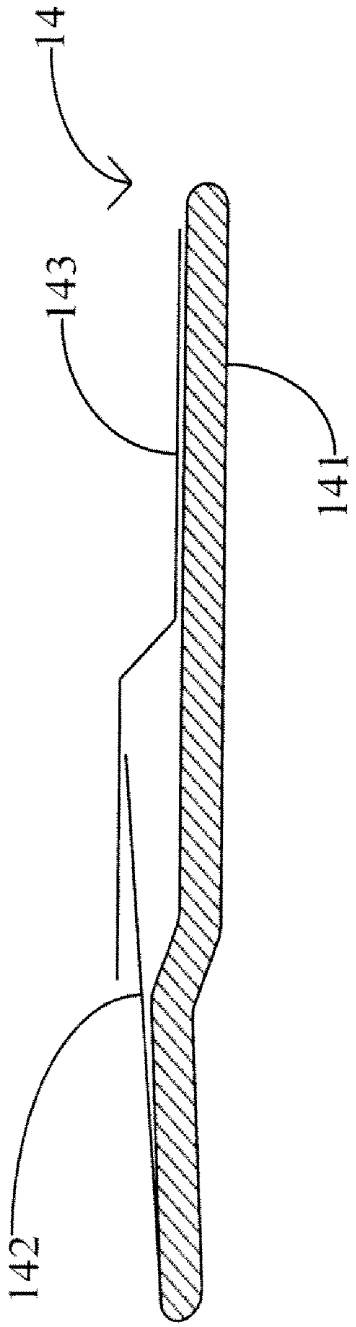


FIG.4 (b)

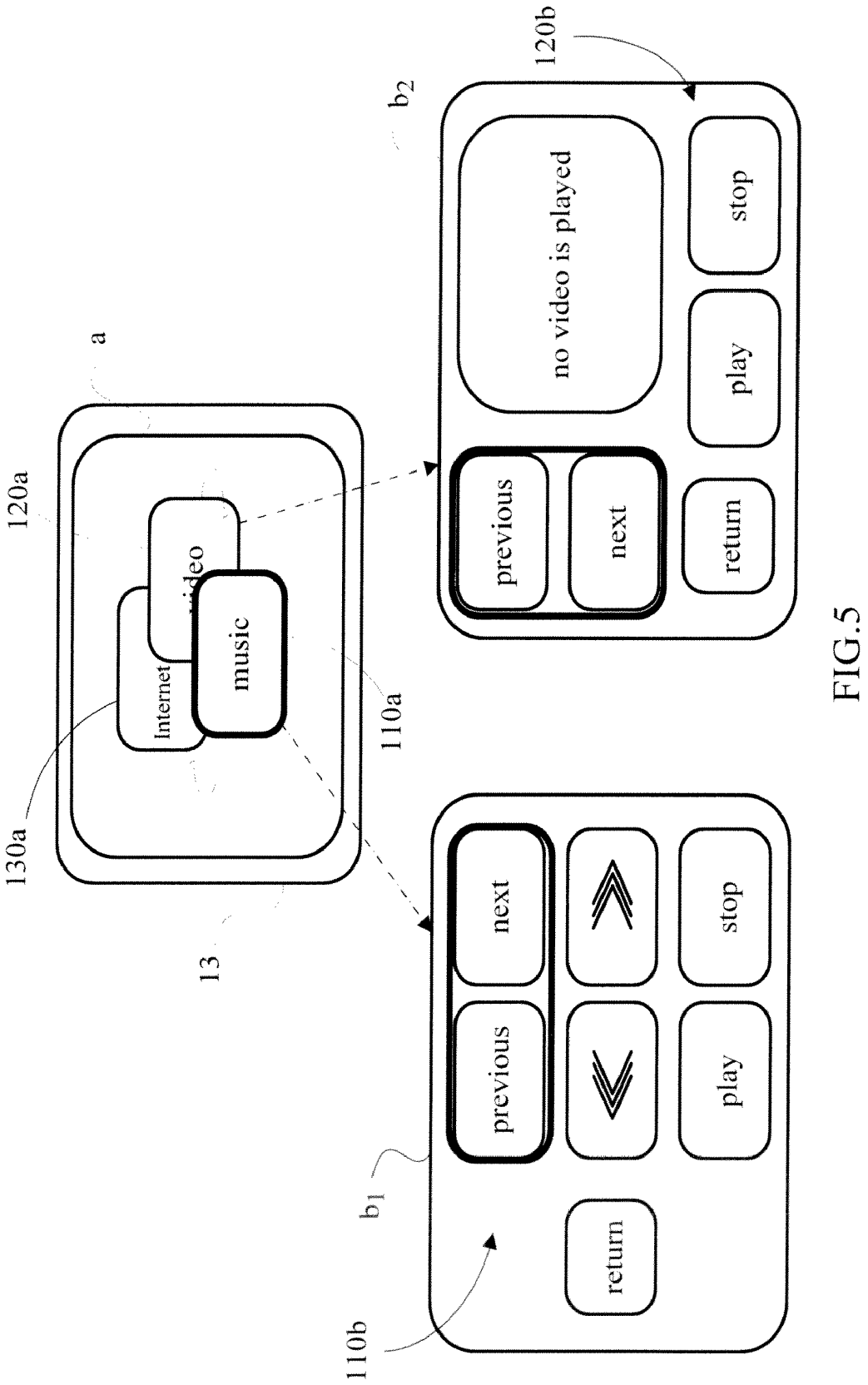

a
120a
130a
Internet
video
music
13
110a
120b
b_2
no video is played
previous
next
return
play
stop
110b
b_1
previous
next
return
play
stop

FIG.5

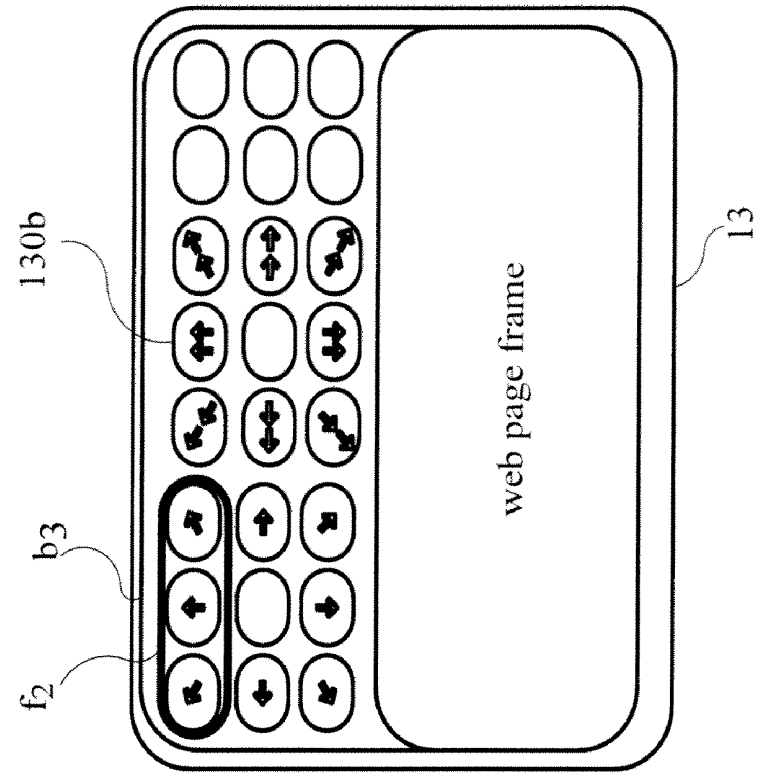


FIG.6(b)

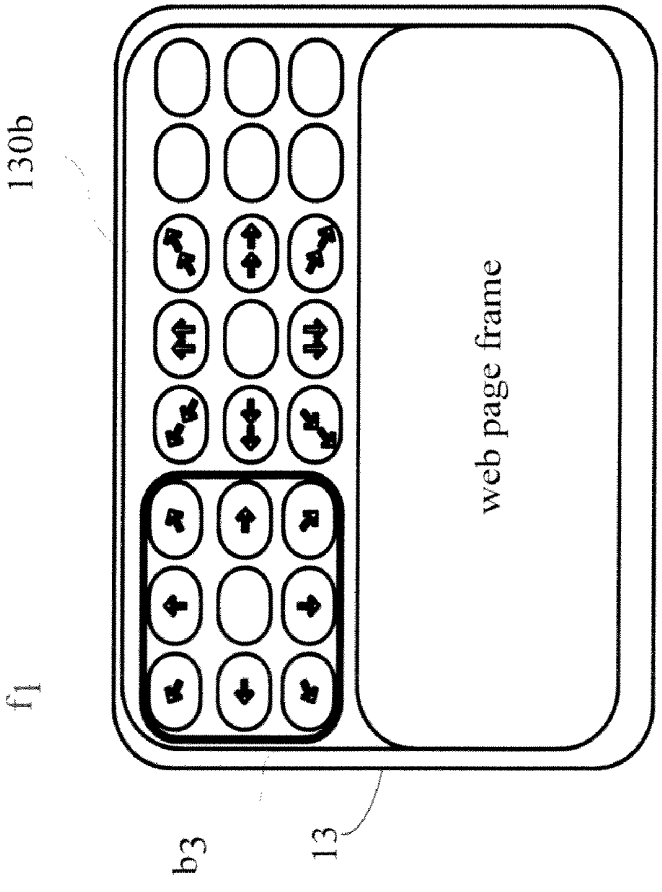


FIG.6(a)

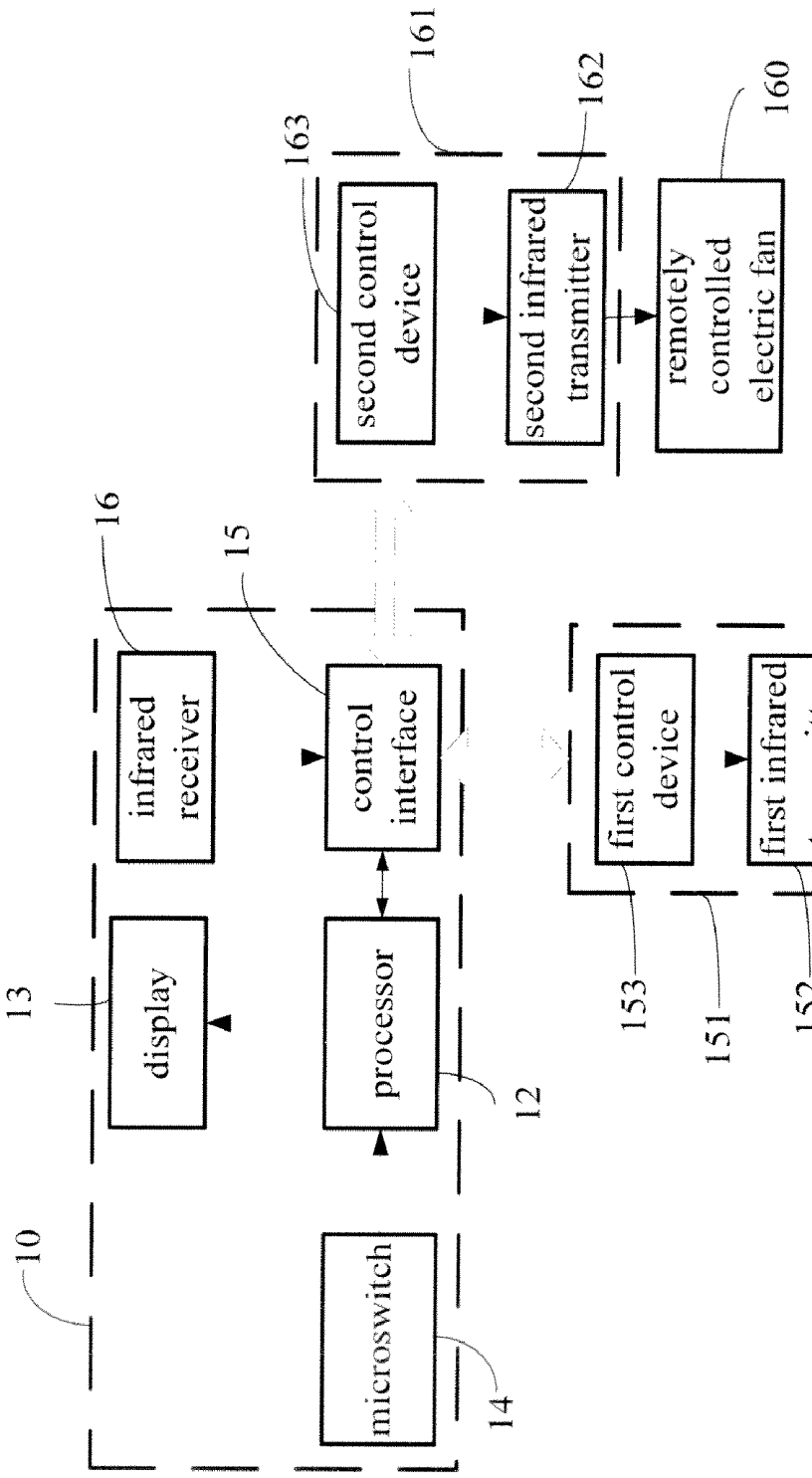

10
microswitch
14
12
processor
control interface
15
16
infrared receiver
13
display
153
first control device
151
152
first infrared transmitter
150
television
161
163
second control device
162
second infrared transmitter
160
remotely controlled electric fan

FIG. 7

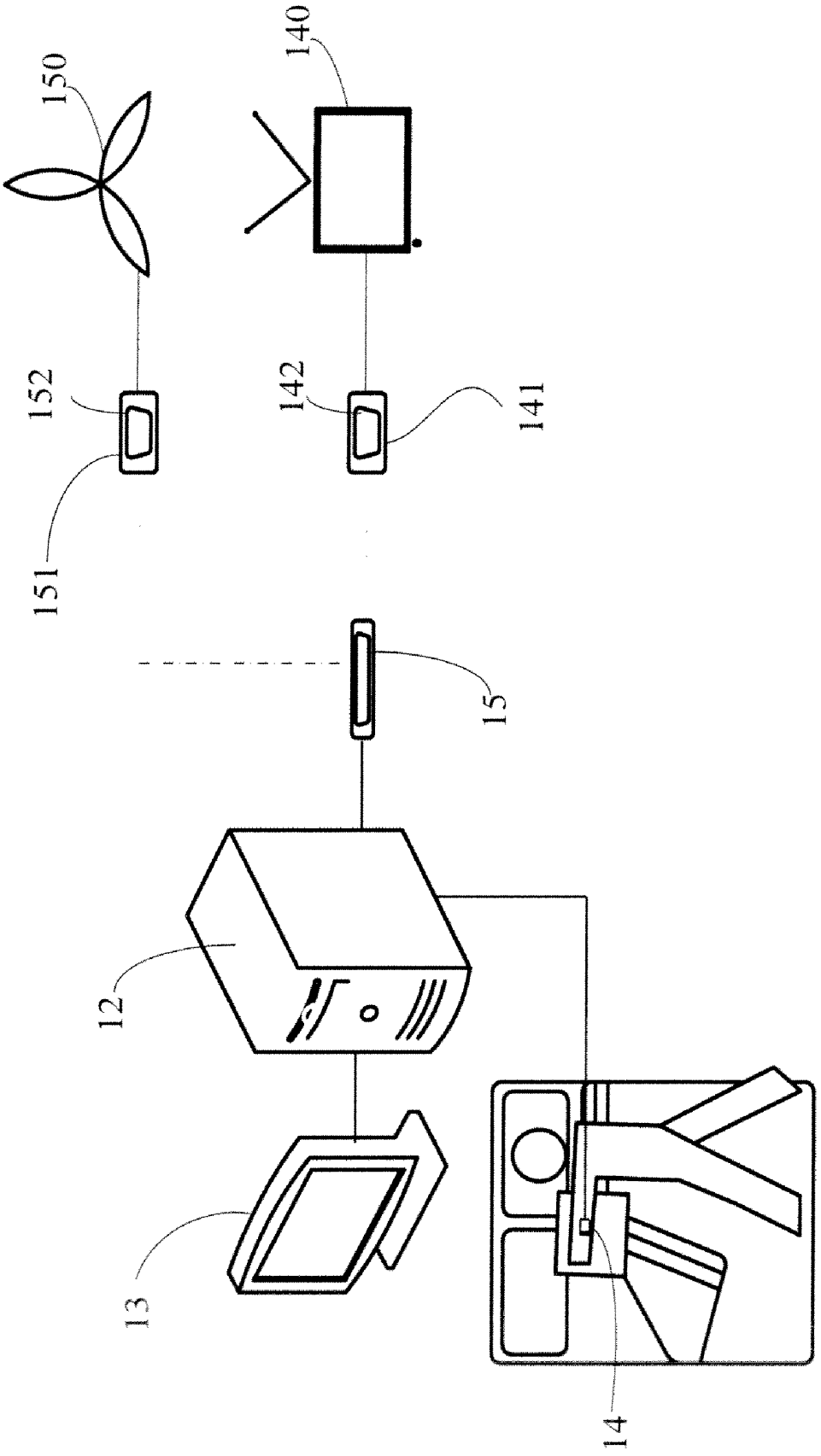


FIG.8

TACTILE REMOTE CONTROL SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a remote control system, particularly to a tactile remote control system, wherein microswitches are used to input signals.

[0003] 2. Description of the Related Art

[0004] With the advance of technology and science, more and more electric appliances are used in daily life. Conventionally, the start and operation of various appliances are separately controlled by different controllers, which is inconvenient and time-consuming. Therefore, it is favorable to integrate various controllers into a single device.

[0005] Some of the prior-art remote control systems are hand-free devices. For example, there is an eye-blink communication system, wherein a camera captures the images of the head, and an image processing technology obtains the characteristics of the user's eyes. The image variation between opening eyes and closing eyes is used to verify input signals. In cooperation with the related software, the abovementioned technology can control various devices remotely. Although the eye-blink communication system can be operated simply, it has disadvantages of low operating speed and ocular fatigue. Another prior art proposes an EOG (electro-oculograph) technology, which is based on the voltage difference between the cornea and retina of the eyeball. A plurality of electrodes is attached to the perimeter of the eye. The technology detects the direction of eye movement and the blinks of the eye according to the voltage variation between electrodes. The direction of eye movement is used to control the movement of the operating cursor, and the eye blinks are used as the input signal. However, the aging and regeneration of the horny layer of the skin would vary the resistance and voltage detected by the electrodes attached to the skin. Therefore, the OEG device is unsuitable for long-term wear.

[0006] Another prior art proposes an infra-red video system (IRVS), which projects infrared ray onto the eye and its perimeter and uses an infrared camera to detect the pupil to track the movement of the pupil. A system software controls the cursor according to the movement of the pupil. However, the user will be tired by that he has to persistently face the camera. Besides, IRVS is very expensive. Thus, a manufacturer proposes a low-cost and easy-to-operate IROG (infrared oculography) technology, wherein an infrared source and an infrared receiver are arranged on an eyeglass frame. Infrared ray is also projected onto the eye and its perimeter. The infrared receiver receives the reflections from the pupil, iris and sclera and converts the reflections into a current signal. The system differentially amplifies the current signal, determines the turning angle of the eyeball according to value of the signal, and translates the turning angle into an instruction. However, short-range use of infrared ray is likely to irritate the eyes, and long-term use of infrared ray may harm the eyes. Recently, a research organization proposed an optical-type eye tracking system, which comprises a head-mounted display, a light source on the display, and a camera below the display. The user wears the head-mounted display, and the camera detects the position of the pupil. The image processing sets the center of the pupil as the operating cursor. Thereby, the user can use his eye to control the operating cursor. However, the head-mounted display is heavy and burdensome for the user. Further, the head-mounted display is likely to slip down, causing a wrong signal.

[0007] From the above description, it is known that the conventional designs have systematic drawbacks and operating inconveniences. Thus, the present invention proposes a novel tactile remote control system to overcome the conventional problems.

SUMMARY OF THE INVENTION

[0008] The primary objective of the present invention is to provide a tactile remote control system, whose interface is simple and easy-to-operate, and whose price is not too high.

[0009] Another objective of the present invention is to provide a tactile remote control system, whose determination process is simple and free of complicated recognition procedures, wherefore the probability of wrong judgement is reduced.

[0010] To achieve the abovementioned objectives, the present invention uses a processor to control at least one controlled device. The processor is connected with a display and a microswitch. The processor presents a graphic user interface of the controlled device on the display. The graphic user interface has a plurality of function keys. The function keys respectively control corresponding actions of the controlled device. The microswitch sends a remote control signal to the processor according to the graphic user interface. The processor remotely controls the controlled device according to the remote control signal.

[0011] When controlling a plurality of controlled devices, the processor will establish a graphic user interface for each controlled device, and alternately and cyclically presents all the graphic user interfaces on the display. The microswitch sends a remote control signal to the processor according to the contents presented on the display, and the processor presents a special graphic user interface. Then, the microswitch further operates a function key on the graphic user interface.

[0012] Below, the embodiments are described in detail in cooperation with the attached drawings to make easily understood the objectives, technical contents, characteristics and accomplishments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** is a block diagram schematically showing the architecture of a tactile remote control system according to a first embodiment of the present invention;

[0014] FIG. **2** is a diagram schematically showing the application of the tactile remote control system according to the first embodiment of the present invention;

[0015] FIG. **3** is a block diagram schematically showing the operating interface the processor establishes for the controlled devices according to the first embodiment of the present invention;

[0016] FIG. **4**(*a*) is a diagram schematically showing the structure of a microswitch according to the first embodiment of the present invention;

[0017] FIG. **4**(*b*) is another diagram schematically showing the structure of a microswitch according to the first embodiment of the present invention;

[0018] FIG. **5** is a diagram schematically showing that a display alternately and cyclically presents control keys according to the first embodiment of the present invention;

[0019] FIGS. **6**(*a*) and **6**(*b*) are diagrams schematically a three-stage operating interface according to the first embodiment of the present invention;

[0020] FIG. **7** is a block diagram schematically showing the architecture of a tactile remote control system according to a second embodiment of the present invention; and

[0021] FIG. **8** is a diagram schematically showing the application of the tactile remote control system according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] The primary objective of the present invention is to provide a tactile remote control system, which integrates the control functions of the daily-life electric appliances to satisfy some special users, and which is operated in a tactile way, and which provides an easy-to-understand graphic user interface, whereby any person can operate the tactile remote control system after a brief instruction.

[0023] Refer to FIG. **1** and FIG. **2**. FIG. **1** is a block diagram schematically showing the architecture of a tactile remote control system according to a first embodiment of the present invention. FIG. **2** is a diagram schematically showing the application of the tactile remote control system according to the first embodiment of the present invention. The tactile remote control system **10** of the present invention comprises a processor **12**, a display **13** connected with the processor **12**, and a microswitch **14**. In one embodiment, the processor **12** is a central processing unit (CPU) of a computer. The CPU is connected with a plurality of controlled devices **100***a*, **100***b* and **100***c*. The controlled devices **100***a*, **100***b* and **100***c* may be audio/video softwares of a computer, Internet-access elements of a computer, or daily-life electric appliances, such as electric fans, air conditioners, and televisions. In fact, the controlled device may be any electric device the user demands. Refer to FIG. **3**. According to the operation requirements, the processor **12** respectively establish a label **1**, a label **2**, and a label **3** for the controlled devices **100***a*, **100***b* and **100***c*, and also establishes a plurality of control keys **4** and a return key **5** for each label hierarchically. The control keys **4** are organized logically according to the operation procedures and the relationship therebetween. The processor **12** organizes the labels **1**, **2**, and **3** of the same layer, or the control keys **4** and the return key **5** of the same layer, into a graphic user interface (GUI). The processor **12** presents the GUI on the display **13**, wherein the processor **12** alternately and cyclically presents the labels **1**, **2**, and **3**, or the control keys **4** and the return key **5** on the display **13**.

[0024] Refer to FIG. **4**(*a*). The microswitch **14** comprises a non-woven fabric **141**, a negative electrode plate **142** arranged on the non-woven fabric **141**, and a positive electrode plate **143** installed at the top of the non-woven fabric **141** and extending to above the negative electrode plate **142**. The microswitch **14** may be attached to any region of the body. For example, the microswitch **14** is attached to the eyebrow in this embodiment. To prevent the microswitch **14** from slipping off, the non-woven fabric **141** may be a self-adhesive non-woven fabric able to stick to the body. In the present invention, another flexible material may replace the non-woven fabric **141**. Refer to FIG. **4**(*b*). A gap originally exists between the negative electrode **142** and the positive electrode plate **143**. When the user raises his head, the non-woven fabric **141** deforms, which makes the negative and positive electrode plates **142** and **143** contact each other and causes electric conduction between the negative and positive electrode plates **142** and **143**. The processor **12** receives the signal of electric conduction and executes the function of a label or a function key on the display **13**. The user watches the presentation of the display **13** and uses the microswitch to select the intended function. The user can repeat the above-mentioned procedures to remotely control the operations of the controlled device step-by-step.

[0025] The present invention does not limit the position where the microswitch is attached. The microswitch may also be attached to fingers or other positions where the muscle works. To reduce the probability of wrong triggering, each GUI has a return key. Alternatively, the triggering is delayed for a predetermined period of time. Once no remote control signal is received within the predetermined period of time, GUI returns to the preceding layer. Alternatively, the processor **12** confirms an instruction with quick double clicks of the microswitch. In the present invention, the operating modes can be modified according to practical conditions.

[0026] Below, several embodiments are used to further exemplify the present invention.

[0027] Refer to FIG. **5**. In this embodiment, the tactile remote control system is used to control the music play software, video play software and Internet-access element in a computer. Firstly, the processor **12** respectively establishes a music label **110***a*, a video label **120***a*, and an Internet-access label **130***a* respectively for the music play software, video play software and Internet-access element. The labels **110***a*, **120***a* and **130***a* are respectively linked to corresponding control keys **110***b*, **120***b*, and **130***b* (the control keys **130***b* are not shown in FIG. **5**). The processor **12** arranges the labels **110***a*, **120***a*, and **130***a* in the same GUI a and presents them on the display **13** alternately and cyclically according to the sequence of execution.

[0028] The music label **110***a* is linked to a control GUI b**1**, which contains all the control keys **110***b*. Similarly, the video label **120***a* is linked to a control GUI b**2**, which contains all the control keys **120***b*. In order to short the time that the control keys **110***b* or **120***b* are alternately and cyclically presented on the display **13**, the processor **12** presents the control keys **110***b* of the control GUI b**1** and the control keys **120***b* of the control GUI b**2** in a two-item selection way. Two related selection items are arranged into a selection group and encircled by a boldface frame. The selection groups are alternately and cyclically presented in a sequence from a larger field to a smaller field. The user can promptly select one of the selection groups and then select one of the selection items from the selection group. Refer to FIG. **6**(*a*) and FIG. **6**(*b*). The Internet-access label **130***a* is linked to a control GUI b**3**, which contains all the control keys **130***b* for Internet access. As the operation of Internet access is more complicated, it needs more selection items. Therefore, the control GUI b**3** contains more control keys **130***b*. The processor **12** arranges the control keys **130***b* into an m (rows)×n (columns) array. The processor **12** presents the control GUI b**3** containing m×n control keys **130***b* on the display **13** in a sequence from large selection groups to small selection groups. For example, an i (rows)×j (columns) array of control keys **130***b* is arranged into a large selection group. In this embodiment, a 3×3 array is arranged into a large selection group f**1**. Then, a row or a column of the large selection group f**1** is assigned to be a small selection group f**2**. For example, the row (i=l, j=n) or the column (i=m, j=l) of the 3×3 array is assigned to be a small selection group f**2**. In this embodiment, each small selection group f**2** has 1×3 pieces of control keys **130***b* encircled by a boldface frame. Thus, the user determines a selection field from the large selection groups f**1** firstly, and then selects a small selection group f**2** from the determined large selection

group f1 to reduce the selection field, and finally selects a desired control key **130***b* from the selected small selection group f1. The processor **12** receives the remote control signal of selecting the desired control key **130***b* and executes the instruction of the remote control signal. Such a mode of from a large selection field to a small selection field can accelerate the operation speed. If there are a greater number of labels at the beginning of the selection operation, the labels can also be arranged in the same way to accelerate the operation speed.

[0029] The abovementioned hierarchical selection mode has advantages of fast operation and precise selection. The number of selection groups can vary according to the number of the selection items of the controlled device. In the present invention, the control GUI can be customized according to the requirements of the controlled device. The present invention is not limited by the embodiments described above. Any modification or variation according to the spirit disclosed in the specification is to be also included within the scope of the present invention.

[0030] The tactile remote control system of the present invention can apply to various devices. In addition to the abovementioned softwares of a computer, the present invention can also control household appliances, such as air conditioners, electric lights, televisions, etc., via infrared or Bluetooth communication. Refer to FIG. **7** and FIG. **8**. FIG. **7** is a block diagram of the architecture of a tactile remote control system according to a second embodiment of the present invention. FIG. **8** is a diagram schematically showing the application of the tactile remote control system according to the second embodiment of the present invention. In the second embodiment, the tactile remote control system remotely controls a television **150** and a remotely controlled electric fan **160** via infrared transmission. The television **150** has a first remote controller **151**, which contains a first infrared transmitter **152** and a first control device **153**. The remotely controlled electric fan **160** has a second remote controller **161**, which contains a second infrared transmitter **162** and a second control device **163**. In the second embodiment, the processor **12** links to a control interface **15**, and the control interface **15** further links to an infrared receiver **16**. The control interface **15**, first control device **153** and second control device **163** may be realized with micro controller units (MCU).

[0031] In the second embodiment, the system acquires the control codes of the first and second infrared transmitters **152** and **162** via the infrared receiver **16**, and the control interface **15** stores the control codes in the processor **12**. The user clicks the control keys of the control GUI to enable the control interface **15** to remotely control the first control device **153**, and the first control device **153** drives the first infrared transmitter **152** to control the operations of the television **150**. Alternately, the processor **12** remotely controls the second control device **163** via the control interface **15** to enable the second infrared transmitter **162** to control the operations of the electric fan **160**. In the second embodiment, the processor **12** presents similar control GUI's, and the control process is also similar to that of the first embodiment. Therefore, they are not repeated again herein.

[0032] In conclusion, the present invention has the following characteristics. Firstly, the present invention is inexpensive because of a simple structure. Secondly, the cyclic operation mode is easy to understand and able to precisely select the desired item. Thirdly, the operation from large selection groups to small selection groups enables the user to lock the desired operation of the controlled device. Fourthly, the present invention is a diversified remote control system, which can remotely control not only computer softwares but also household appliances. Besides, the control GUI of the present invention can be flexibly modified to control various devices.

[0033] The embodiments described above are to demonstrate the technical contents and characteristics of the present invention to enable the persons skilled in the art to understand, make, and use the present invention. However, these embodiments are not intended to limit the scope of the present invention. Any equivalent modification or variation according to the spirit of the present invention is to be also included within scope of the present invention.

What is claimed is:

1. A tactile remote control system, which is used to control at least one controlled device, comprising

a processor controlling said controlled device and having at least one graphic user interface, wherein said graphic user interface has a plurality of function keys, and wherein each said function key is used to remotely control an operation of said controlled device;

a display electrically connected with said processor and presenting said graphic user interface and said function keys; and

at least one microswitch connected with said processor and used to click one said function key to send out a remote control signal to instruct said processor to remotely control said controlled device to operate.

2. The tactile remote control system according to claim **1**, wherein said processor links to a plurality of said controlled devices, and wherein said processor establishes a label for each said controlled device and establishes at least one said graphic user interface for each said label, wherein said processor alternately and cyclically presents said labels on said display, and wherein said microswitch is used to click one said label presented on said display to enter one said graphic user interface that links to said label.

3. The tactile remote control system according to claim **2**, wherein a given interval of time is preset in said processor, and wherein if said processor does not receive said remote control signal within said given interval of time, said processor resumes alternately and cyclically presenting said labels.

4. The tactile remote control system according to claim **2**, wherein said function keys include at least one return key, and wherein when said return key is clicked, said processor resumes alternately and cyclically presenting said labels.

5. The tactile remote control system according to claim **2**, wherein said labels or said function keys are presented on said display in form of an m(rows)×n(columns) array, and wherein m×n pieces of said labels or said function keys are divided into a plurality of units, and wherein said display alternately and cyclically presents said units, and wherein said microswitch uses said remote control signal to select one of said units that are being presented on said display, and wherein each said unit includes i (rows)×j (columns) pieces of said labels or said function keys, and wherein all said labels or all said control keys of said unit that has been selected are alternately and cyclically presented, and wherein said microswitch uses said remote control signal to select said label or said control key that is being presented on said display to enter said graphic user interface linking to said label or said control key.

6. The tactile remote control system according to claim **5**, wherein said processor sets that i=1 and j=n for said units, and wherein said processor alternately and cyclically presents said units row by row.

7. The tactile remote control system according to claim **5**, wherein said processor sets that i=m and j=1 for said units, and wherein said processor alternately and cyclically presents said units column by column.

8. The tactile remote control system according to claim **1**, wherein said processor is a central processing unit of a computer.

9. The tactile remote control system according to claim **1**, wherein said controlled device is an audio/video play media or an Internet-access element of a computer.

10. The tactile remote control system according to claim **1**, wherein said controlled device is an electric light, a television, an audio device, or an electric fan.

11. The tactile remote control system according to claim **10**, wherein each said controlled device has a remote controller, and wherein said remote controller includes an infrared transmitter and a control device, and wherein said tactile remote control system further comprises a control interface and an infrared receiver sequentially linking to said processor, and wherein said control interface and said control device have an identical program code reading frame, and wherein said infrared receiver receives a control code from said infrared transmitter, and wherein said processor receives said control code via said control interface and records said control code, and wherein when said microswitch sends out said remote control signal, said processor uses said control code to instruct said control interface to remotely control said control device, and wherein said control device instructs said infrared transmitter to enable said controlled device to operate.

12. The tactile remote control system according to claim **1**, wherein said processor alternately and cyclically presents said function keys of each said graphic user interface on said display.

13. The tactile remote control system according to claim **1**, wherein said processor is programmed not to send out said remote control signal unless said microswitch is clicked twice continuously.

* * * * *