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(54) Title: SYSTEM AND METHOD FOR APPLICATION CONTROLLED FRAGRANCE GENERATION

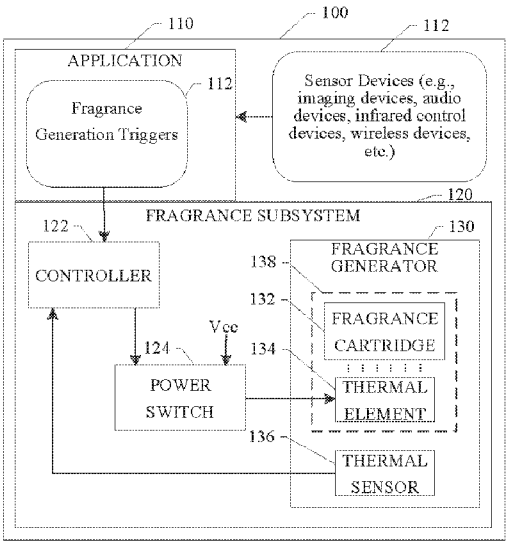


Fig. 1

(57) Abstract: A system and method for application controlled fragrance generation are disclosed. A particular embodiment includes: receiving a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application (1110); determining a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge (1120); and causing a thermal element to heat the fragrance cartridge to the determined temperature (1130).

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SYSTEM AND METHOD FOR APPLICATION CONTROLLED FRAGRANCE GENERATION

TECHNICAL FIELD

[0001] This patent application relates to electronic systems, computing devices, mobile devices, and computer-implemented software, according to various example embodiments, and more specifically to a system and method for application controlled fragrance generation.

BACKGROUND

[0002] There are printed materials, such as scratch-and-sniff stickers, that incorporate encapsulated aromas designed to generate a scent when a user rubs an image. This technology has been used in a wide variety of books, magazines, and advertisements although most popular use has been in children's books. In social sciences, scent generation opens the possibility of forming memories, triggering responses, and eliciting emotion. For humans and many animals, olfaction is one of the primary sensory inputs that be used to draw attention, create interest, and enhance engagement. This makes scent generation technologies useful for a wide variety of purposes including more realistic immersive experiences, eliciting conditioned responses, entertainment, advertising, and education. For example, scent features can complement future digital textbooks and mobile interactive education applications targeted at improving student engagement and learning outcomes.

[0003] Current computer-based applications and games played on computers or a gaming platform employ the same advanced graphics and sound qualities found in film or video. These technologies create an audiovisual experience that immerses the user in a film or game like never before, stimulating sight, sound and even tactile sensations through deep bass vibrations provided by subwoofers and tactile feedback provided by some game controllers. There remains, however, one form of sensory perception that is not stimulated—the sense of smell.

[0004] Numerous prior art systems have attempted to provide a scent to the environment that compliments or correlates to an audiovisual stimulus. Examples include the smell of burning rubber coordinating with the screech of tires, or the scent of flowers

when a corresponding image appears. Prior art systems have primarily been directed to introducing fragrances to large environments, such as an entire theater. These systems have by and large suffered from the problem that a fragrance will linger long after the coordinating audiovisual input has changed, and may in fact be difficult to replace with another scent as the scenes change. None of these prior art devices, however, provide a useful and commercially viable system for fragrance delivery to enhance an audiovisual presentation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The various embodiments are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings in which:

[0006] Figure 1 illustrates an example embodiment of a system for application controlled fragrance generation;

[0007] Figure 2 illustrates an example embodiment of a fragrance cartridge having embedded thereon a plurality of fragrance regions;

[0008] Figures 3 and 4 illustrate a particular embodiment of the fragrance generator configured for a Secure Digital (SD) card;

[0009] Figure 5 is a processing flow chart illustrating an example embodiment of a method as described herein; and

[0010] Figure 6 shows a diagrammatic representation of a machine in the example form of a computing and/or communication system within which a set of instructions when executed and/or processing logic when activated may cause the machine to perform any one or more of the methodologies described and/or claimed herein.

DETAILED DESCRIPTION

[0011] In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the various embodiments. It will be evident, however, to one of ordinary skill in the art that the various embodiments may be practiced without these specific details.

[0012] In the various embodiments described herein, a system and method for application controlled fragrance generation are disclosed. The example embodiment includes a fragrance generator coupled with a controller and a software-controllable switch for activating the fragrance generator. The controller can be triggered to activate

the switch and the fragrance generator by an application program running on a computing platform or mobile device. The controller can also be triggered to activate the switch and the fragrance generator by inputs from various sensor devices, such as imaging devices (e.g., cameras), audio devices (e.g., voice or speech recognition devices), infrared control devices, wireless devices (e.g., WiFi, Bluetooth, Bluetooth Low Energy, RFID, NFC), and the like. WiFi or Wi-Fi is a local area wireless technology that allows an electronic device to exchange data or connect to the internet using UHF or super high frequency (SHF) radio waves. Bluetooth is a wireless technology standard for exchanging data over short distances using short wavelength, ultra-high frequency (UHF) radio waves. Radio frequency identification (RFID) is a well-known technology for the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects, for example. Near-field or near field communication (NFC) is a form of short-range wireless communication where the antenna used is much smaller than the wavelength of the carrier signal. WiFi, Bluetooth, Bluetooth Low Energy, RFID, and NFC technologies are well-known to those of ordinary skill in the art.

[0013] In a particular embodiment, a fragrance cartridge of the fragrance generator can be configured to conform to the form factor of a Secure Digital (SD) card. Secure Digital (SD) is a nonvolatile memory card used extensively in portable devices, such as mobile phones, digital cameras, global positioning satellite (GPS) navigation devices, handheld consoles, tablet computers, and the like. The fragrance cartridge, configured as an SD card, can be inserted into a standard SD card slot on a computing platform or mobile device. It will be apparent to those of ordinary skill in the art that the fragrance cartridge can be configured in different form factors as well.

[0014] Figure 1 illustrates an example embodiment of a system for application controlled fragrance generation. Referring now to Figure 1, an example embodiment 100 described herein is configured to provide an application 110 running in a software execution environment provided by a computing platform 100 of an example embodiment. The computing platform 100 may be a personal computer (PC), a laptop computer, a tablet computing system, a Personal Digital Assistant (PDA), a cellular telephone, a smart phone, a web appliance, a set-top box (STB), a game console, or any machine capable of executing a set of instructions (sequential or otherwise) or activating processing logic that specifies actions to be taken by that machine. The computing platform 100 of an example

embodiment can include one or more sensor devices 112, such as imaging devices (e.g., cameras), audio devices (e.g., voice or speech recognition devices), infrared control devices, wireless devices (e.g., WiFi, Bluetooth, Bluetooth Low Energy, RFID, NFC), and the like. The application 110 can use input provided by the sensor devices 112 and/or internal programming processes to generate fragrance generation triggers that cause a fragrance subsystem 120 to activate and emit a selected fragrance. The fragrance generation triggers can be caused by a particular image, a voice command, a user gesture, or a command or input sent from the sensor devices 112. The fragrance generation triggers in an example embodiment can be implemented as data objects or messages conveyed from the application 110 to the fragrance subsystem 120 using standard data transmission mechanisms. As described in more detail below, the generation and transmission of the fragrance generation triggers and the resulting emission of a selected fragrance can be controlled by the application 110 to coincide with events, actions, imagery, sounds, or gestures depicted in the application 110. In this manner, the system 100 can enhance a user experience in the application 110 by selectively and synchronously causing an olfactory stimulus to be provided to a user in combination with the other stimuli provided by the application 100 and other subsystems of system 100.

[0015] Referring still to Figure 1, the system 100 includes a fragrance subsystem 120. In an example embodiment, the fragrance subsystem 120 includes a controller 122, a software-controllable switch 124, and a fragrance generator 130. The controller 122 can be a specialized processing module of subsystem 120. Such processing modules are well-known in the art. Alternatively, the controller 122 can be a general data processor of the system 100. The controller 122 can receive the information indicative of the fragrance generation triggers in an example embodiment as data objects or messages conveyed from the application 110 to the fragrance subsystem 120 using standard data transmission mechanisms. The software-controllable switch 124 is a standard controllable switch for selectively applying a voltage or electrical current to a thermal element 134 of the fragrance generator 130 under direction of the controller 122.

[0016] In an example embodiment, the fragrance generator 130 includes a fragrance cartridge 132, a thermal element 134, and a thermal sensor 136. Under direction of controller 122, the thermal element 134 can be selectively activated to apply a pre-determined amount of heat to the fragrance cartridge 132. The amount of heat applied to the fragrance cartridge 132 can be varied by selectively applying different pre-determined

voltage or electrical current levels to the fragrance cartridge 132. The amount of heat applied to the fragrance cartridge 132 can also be varied by selectively adjusting the length of time that heat is applied to the fragrance cartridge 132 by thermal element 134. In an example embodiment, the thermal element 134 can be a standard electrically activated thermal foil or other conventional electrically activated heating device.

[0017] Figure 2 illustrates an example embodiment of a fragrance cartridge 132 having embedded thereon one or more fragrance regions 140. Referring now to Figure 2, the fragrance cartridge 132 has embedded thereon one or more fragrance regions 140, which have each been saturated with a particular heat-activated scent formulation that vaporizes and emits a particular fragrance when the fragrance region 140 is heated to a pre-determined temperature by the thermal element 134. Such heat-activated scent formulations are well-known in the art. An example embodiment includes a plurality of fragrance regions 140, each being activated at a different temperature T1 to Tn. Thus, as the thermal element 134 heats the fragrance cartridge 132 to a temperature corresponding to Tn, the corresponding fragrance region (e.g., region 142 in this case) becomes active and the particular heat-activated scent formulation embedded on fragrance region 142 vaporizes emitting the particular fragrance. The emitted fragrance is allowed to escape the fragrance cartridge 132 via a vent 144.

[0018] Referring again to Figure 1 in a particular embodiment, a thermal sensor 136 is included in the fragrance generator 130 to sense the temperature to which the thermal element 134 has been heated. Information indicative of the current temperature of thermal element 134 can be generated and transmitted to controller 122 by the thermal sensor 136. As a result, the thermal sensor 136 provides a useful feedback loop for the controller 122. This feedback loop enables the controller 122 to closely control the temperature of the fragrance cartridge 132 and thus closely control the specific fragrance emitted by the fragrance cartridge 132. This feedback loop also enables the controller 122 to monitor and control the temperature of the thermal element 134 and thereby prevent an overheat situation and maintain the safety of the system.

[0019] In a particular embodiment, the fragrance cartridge 132 can be configured to conform to the form factor of a Secure Digital (SD) card. A particular embodiment of the fragrance generator 130 configured for an SD card is illustrated in Figures 3 and 4. Referring to Figures 3 and 4, the fragrance cartridge 132 can be configured to the dimensions of a standard SD card form factor. As a result, the fragrance cartridge 132 can

fit within a standard SD reader connector housing 138. The thermal element 134 can be embedded or inserted into the SD reader connector housing 138 for positioning proximate to the fragrance cartridge 132 when the fragrance cartridge 132 is inserted into the SD reader connector housing 138. As a result, the fragrance cartridge 132, configured as an SD card, can be inserted into a standard SD card slot on a computing platform or mobile device. This configuration allows a user to conveniently insert or remove a variety of different fragrances into or out of the SD card slot on the computing platform or mobile device. In a particular embodiment, a specially configured key or switch detection mechanism can be used on the SD card reader connector housing 138 to detect the insertion of either a standard SD card or a fragrance cartridge configured as an SD card. It will be apparent to those of ordinary skill in the art that the fragrance cartridge 132 and the fragrance generator 130 can be configured in a variety of different form factors as well.

[0020] As described herein, an example embodiment includes a fragrance generator coupled with a controller and a software-controllable switch for activating the fragrance generator. The controller can be triggered to activate the switch and the fragrance generator by an application program running on a computing platform or mobile device. The controller can also be triggered to activate the switch and the fragrance generator by inputs from various sensor devices, such as imaging devices, audio devices, infrared control devices, wireless devices, and the like. As a result, the application is capable of inserting olfactory stimuli into the operation of the application. For example, a game sequence may cause a game application to trigger the scent of gunpowder when a gun is fired. A photo viewing application can be configured to trigger the scent of flowers when an image of flowers is shown on a display screen. In this manner, a variety of scents can be triggered based on images shown or sounds heard as part of an application presentation. Similarly, sequences of fragrances can be triggered when a corresponding sequence is encountered in the operation of the application. For example, a character depicted in an application might be walking in a forest. In synchronous fashion, the application can use the embodiments described herein to trigger the fragrance of a forest to correspond to the character in the application. As the character continues to walk and arrives at the beach, the application can again use the embodiments described herein to trigger the fragrance of a beach to correspond to the current situation of the character in the application. In other embodiments, a sequence of scents can be generated and emitted according to the content

of the text book, or electronic book (ebook). Thus, in a variety of applications, the embodiments described herein can enhance the user experience by enabling the application to add a variety of olfactory elements.

[0021] Referring now to Figure 5,a processing flow diagram illustrates an example embodiment of a method 1100 for application controlled fragrance generation as described herein. The method1100 of an example embodiment includes: receiving a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application(processing block 1110); determining a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge (processing block 1120); and causing a thermal element to heat the fragrance cartridge to the determined temperature(processing block 1130).

[0022] Figure 6 shows a diagrammatic representation of a machine in the example form of a mobile computing and/or communication system 700 within which a set of instructions when executed and/or processing logic when activated may cause the machine to perform any one or more of the methodologies described and/or claimed herein. In alternative embodiments, the machine operates as a standalone device or may be connected (e.g., networked) to other machines. In a networked deployment, the machine may operate in the capacity of a server or a client machine in server-client network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. The machine may be a personal computer (PC), a laptop computer, a tablet computing system, a Personal Digital Assistant (PDA), a cellular telephone, a smart phone, a web appliance, a set-top box (STB), a gaming console, a network router, switch or bridge, or any machine capable of executing a set of instructions (sequential or otherwise) or activating processing logic that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" can also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions or processing logic to perform any one or more of the methodologies described and/or claimed herein.

[0023] The example mobile computing and/or communication system 700 includes a data processor 702 (e.g., a System-on-a-Chip (SoC), general processing core, graphics core, and optionally other processing logic)and a memory 704, which can communicate with each other via a bus or other data transfer system 706. The mobile computing and/or

communication system 700 may further include various input/output (I/O) devices and/or interfaces 710, such as a touch screen display, an audio jack, and optionally a network interface 712. In an example embodiment, the network interface 712 can include one or more radio transceivers configured for compatibility with any one or more standard wireless and/or cellular protocols or access technologies (e.g., 2nd (2G), 2.5, 3rd (3G), 4th (4G) generation, and future generation radio access for cellular systems, Global System for Mobile communication (GSM), General Packet Radio Services (GPRS), Enhanced Data GSM Environment (EDGE), Wideband Code Division Multiple Access (WCDMA), LTE, CDMA2000, WLAN, Wireless Router (WR) mesh, and the like). Network interface 712 may also be configured for use with various other wired and/or wireless communication protocols, including TCP/IP, UDP, SIP, SMS, RTP, WAP, CDMA, TDMA, UMTS, UWB, WiFi, WiMax, Bluetooth, IEEE 802.11x, and the like. In essence, network interface 712 may include or support virtually any wired and/or wireless communication mechanisms by which information may travel between the mobile computing and/or communication system 700 and another computing or communication system via network 714.Fragrance generator 130 includes the system components as described above in an example embodiment.

[0024] The memory 704 can represent a machine-readable medium on which is stored one or more sets of instructions, software, firmware, or other processing logic (e.g., logic 708) embodying any one or more of the methodologies or functions described and/or claimed herein. The logic 708, or a portion thereof, may also reside, completely or at least partially within the processor 702 during execution thereof by the mobile computing and/or communication system 700. As such, the memory 704 and the processor 702 may also constitute machine-readable media. The logic 708, or a portion thereof, may also be configured as processing logic or logic, at least a portion of which is partially implemented in hardware. The logic 708, or a portion thereof, may further be transmitted or received over a network 714 via the network interface 712. While the machine-readable medium of an example embodiment can be a single medium, the term "machine-readable medium" should be taken to include a single non-transitory medium or multiple non-transitory media (e.g., a centralized or distributed database, and/or associated caches and computing systems) that store the one or more sets of instructions. The term "machine-readable medium" can also be taken to include any non-transitory medium that is capable of storing, encoding or carrying a set of instructions for execution by the

machine and that cause the machine to perform any one or more of the methodologies of the various embodiments, or that is capable of storing, encoding or carrying data structures utilized by or associated with such a set of instructions. The term "machine-readable medium" can accordingly be taken to include, but not be limited to, solid-state memories, optical media, and magnetic media.

[0025] In various embodiments as described herein, example embodiments include at least the following examples.

[0026] A fragrance generation subsystem comprising: a controller in data communication with an application; and a fragrance generator coupled to the controller, the fragrance generator including a fragrance cartridge and a thermal element, the fragrance cartridge emitting a selected fragrance when the thermal element is activated under control of the application.

[0027] The fragrance generation subsystem as above further including a software-controllable switch coupled between the controller and the fragrance generator for activating the thermal element of the fragrance generator under direction of the controller.

[0028] The fragrance generation subsystem as above wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

[0029] The fragrance generation subsystem as above wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

[0030] The fragrance generation subsystem as above wherein the fragrance cartridge is configured to have embedded thereon a plurality of fragrance regions.

[0031] The fragrance generation subsystem as above wherein the plurality of fragrance regions are each activated at a different temperature.

[0032] The fragrance generation subsystem as above further including a thermal sensor coupled between the controller and the thermal element to sense the temperature to which the thermal element has been heated.

[0033] The fragrance generation subsystem as above wherein the fragrance cartridge is configured to conform to the form factor of a Secure Digital (SD) card.

[0034] A system comprising: an application; a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device, the sensor device being in data communication with the application; a controller in data communication with the application; and a fragrance generator coupled to the controller, the fragrance generator including a fragrance cartridge and a thermal element, the fragrance cartridge emitting a selected fragrance when the thermal element is activated under control of the application.

[0035] The system as above further including a software-controllable switch coupled between the controller and the fragrance generator for activating the thermal element of the fragrance generator under direction of the controller.

[0036] The system as above wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

[0037] The system as above wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an input received from the sensor device.

[0038] The system as above wherein the fragrance cartridge is configured to have embedded thereon a plurality of fragrance regions.

[0039] The system as above wherein the plurality of fragrance regions are each activated at a different temperature.

[0040] The system as above further including a thermal sensor coupled between the controller and the thermal element to sense the temperature to which the thermal element has been heated.

[0041] The system as above wherein the fragrance cartridge is configured to conform to the form factor of a Secure Digital (SD) card.

[0042] A method comprising: receiving a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application; determining, by a controller, a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge; and causing a thermal element to heat the fragrance cartridge to the determined temperature.

[0043] The method as above further including receiving a second fragrance trigger from the application, the second fragrance trigger being associated with a particular

fragrance that corresponds to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

[0044] The method as above further including causing the thermal element to heat the fragrance cartridge to a plurality of different temperatures to cause the fragrance cartridge to emit a plurality of different fragrances.

[0045] The method as above further including sensing the temperature to which the thermal element has been heated.

[0046] An apparatus comprising: a controller means in data communication with an application; and a fragrance generation means coupled to the controller means, the fragrance generation means including a fragrance cartridge means and a heating means, the fragrance cartridge means emitting a selected fragrance when the heating means is activated under control of the application.

[0047] The apparatus as above further including a software-controllable switching means coupled between the controller means and the fragrance generation means for activating the heating means of the fragrance generation means under direction of the controller means.

[0048] The apparatus as above wherein the application is configured to convey a fragrance trigger to the controller means, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

[0049] The apparatus as above wherein the application is configured to convey a fragrance trigger to the controller means, the fragrance trigger corresponding to an input received from a sensing means of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

[0050] The apparatus as above wherein the fragrance cartridge means is configured to have embedded thereon a plurality of fragrance regions.

[0051] The fragrance generation subsystem as above wherein the plurality of fragrance regions are each activated at a different temperature.

[0052] The apparatus as above further including a thermal sensing means coupled between the controller means and the heating means to sense the temperature to which the heating means has been heated.

[0053] The apparatus as above wherein the fragrance cartridge means is configured to conform to the form factor of a Secure Digital (SD) card.

[0054] A non-transitory machine-useable storage medium embodying instructions which, when executed by a machine, cause the machine to: receive a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application; determine a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge; and cause a thermal element to heat the fragrance cartridge to the determined temperature.

[0055] The machine-useable storage medium as above being further configured to receive a second fragrance trigger from the application, the second fragrance trigger being associated with a particular fragrance that corresponds to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

[0056] The machine-useable storage medium as above being further configured to cause the thermal element to heat the fragrance cartridge to a plurality of different temperatures to cause the fragrance cartridge to emit a plurality of different fragrances.

[0057] The machine-useable storage medium as above being further configured to sense the temperature to which the thermal element has been heated.

[0058] The Abstract of the Disclosure is provided to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separate embodiment.

CLAIMS

What is claimed is:

1. A fragrance generation subsystem comprising:
   a controller in data communication with an application; and
   a fragrance generator coupled to the controller, the fragrance generator including a fragrance cartridge and a thermal element, the fragrance cartridge emitting a selected fragrance when the thermal element is activated under control of the application.

2. The fragrance generation subsystem of claim 1 further including a software-controllable switch coupled between the controller and the fragrance generator for activating the thermal element of the fragrance generator under direction of the controller.

3. The fragrance generation subsystem of claim 1 wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

4. The fragrance generation subsystem of claim 1 wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

5. The fragrance generation subsystem of claim 1 wherein the fragrance cartridge is configured to have embedded thereon a plurality of fragrance regions.

6. The fragrance generation subsystem of claim 5 wherein the plurality of fragrance regions are each activated at a different temperature.

7. The fragrance generation subsystem of claim 1 further including a thermal sensor coupled between the controller and the thermal element to sense the temperature to which the thermal element has been heated.

8. The fragrance generation subsystem of claim 1 wherein the fragrance cartridge is configured to conform to the form factor of a Secure Digital (SD) card.

9. A system comprising:

an application;

a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device, the sensor device being in data communication with the application;

a controller in data communication with the application; and

a fragrance generator coupled to the controller, the fragrance generator including a fragrance cartridge and a thermal element, the fragrance cartridge emitting a selected fragrance when the thermal element is activated under control of the application.

10. The system of claim 9further including a software-controllable switch coupled between the controller and the fragrance generator for activating the thermal element of the fragrance generator under direction of the controller.

11. The system of claim 9 wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

12. The system of claim 9 wherein the application is configured to convey a fragrance trigger to the controller, the fragrance trigger corresponding to an input received from the sensor device.

13. The system of claim 9 wherein the fragrance cartridge is configured to have embedded thereon a plurality of fragrance regions.

14. The system of claim 13 wherein the plurality of fragrance regions are each activated at a different temperature.

15. The system of claim 9further including a thermal sensor coupled between the controller and the thermal element to sense the temperature to which the thermal element has been heated.

16. The system of claim 9 wherein the fragrance cartridge is configured to conform to the form factor of a Secure Digital (SD) card.

17. A method comprising:

receiving a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application;

determining, by a controller, a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge; and

causing a thermal element to heat the fragrance cartridge to the determined temperature.

18. The method of claim 17further including receiving a second fragrance trigger from the application, the second fragrance trigger being associated with a particular fragrance that corresponds to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

19. The method of claim 17further including causing the thermal element to heat the fragrance cartridge to a plurality of different temperatures to cause the fragrance cartridge to emit a plurality of different fragrances.

20. The method of claim 17further including sensing the temperature to which the thermal element has been heated.

21. An apparatus comprising:

a controller means in data communication with an application; and

a fragrance generation means coupled to the controller means, the fragrance generation means including a fragrance cartridge means and a heating means, the

fragrance cartridge means emitting a selected fragrance when the heating means is activated under control of the application.

22. The apparatus of claim 21further including a software-controllable switching means coupled between the controller means and the fragrance generation means for activating the heating means of the fragrance generation means under direction of the controller means.

23. The apparatus of claim 21 wherein the application is configured to convey a fragrance trigger to the controller means, the fragrance trigger corresponding to an event, action, image, sound, or gesture depicted in the application.

24. A non-transitory machine-useable storage medium embodying instructions which, when executed by a machine, cause the machine to:

receive a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application;

determine a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge; and

cause a thermal element to heat the fragrance cartridge to the determined temperature.

25. The machine-useable storage medium of claim 24being further configured to receive a second fragrance trigger from the application, the second fragrance trigger being associated with a particular fragrance that corresponds to an input received from a sensor device of a type from the group consisting of: an imaging device, an audio device, an infrared control device, and a wireless device.

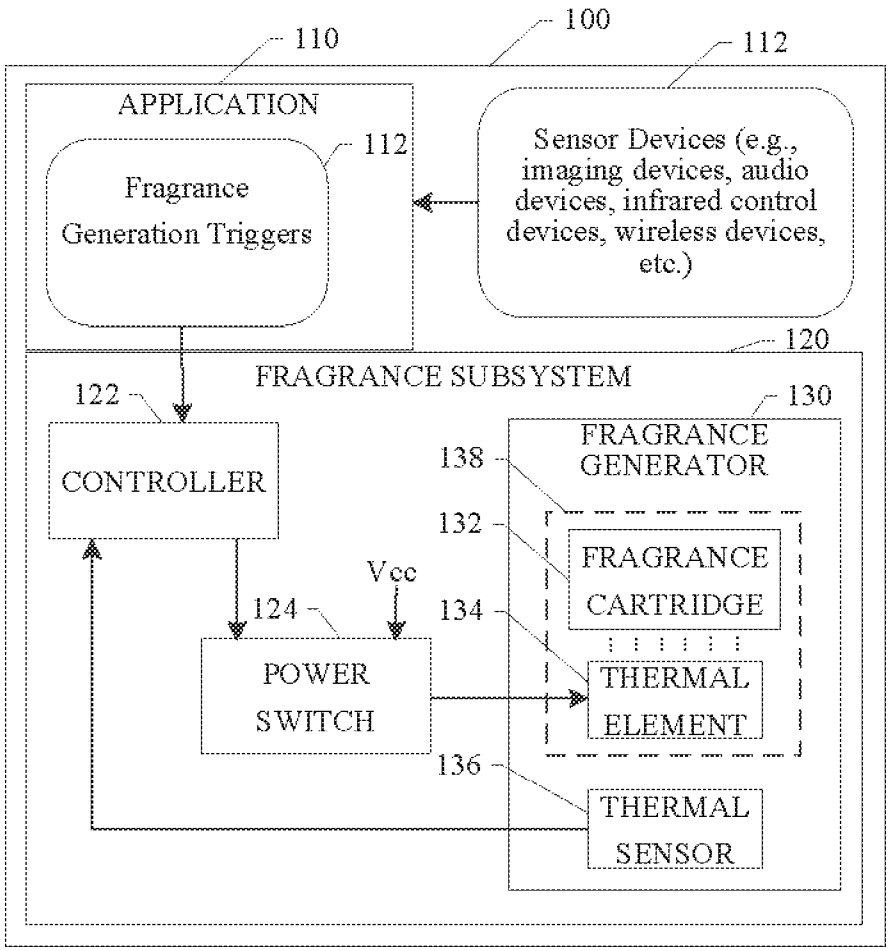

110
100
112
APPLICATION
112
Fragrance Generation Triggers
Sensor Devices (e.g., imaging devices, audio devices, infrared control devices, wireless devices, etc.)
120
FRAGRANCE SUBSYSTEM
122
130
CONTROLLER
FRAGRANCE GENERATOR
138
132
FRAGRANCE CARTRIDGE
Vcc
124
134
POWER SWITCH
THERMAL ELEMENT
136
THERMAL SENSOR

Fig. 1

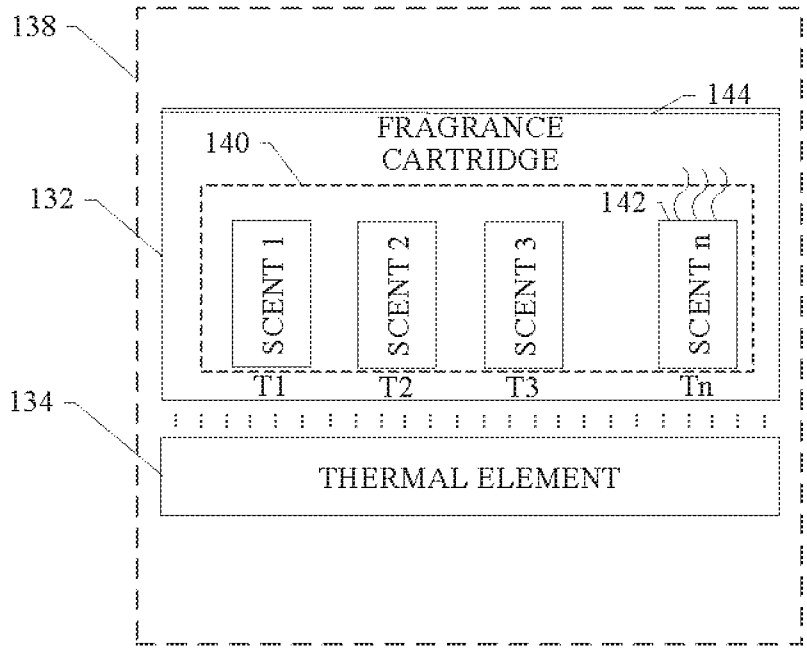

138
144
FRAGRANCE CARTRIDGE
140
132
142
SCENT 1
SCENT 2
SCENT 3
SCENT n
T1
T2
T3
Tn
134
THERMAL ELEMENT

Fig. 2

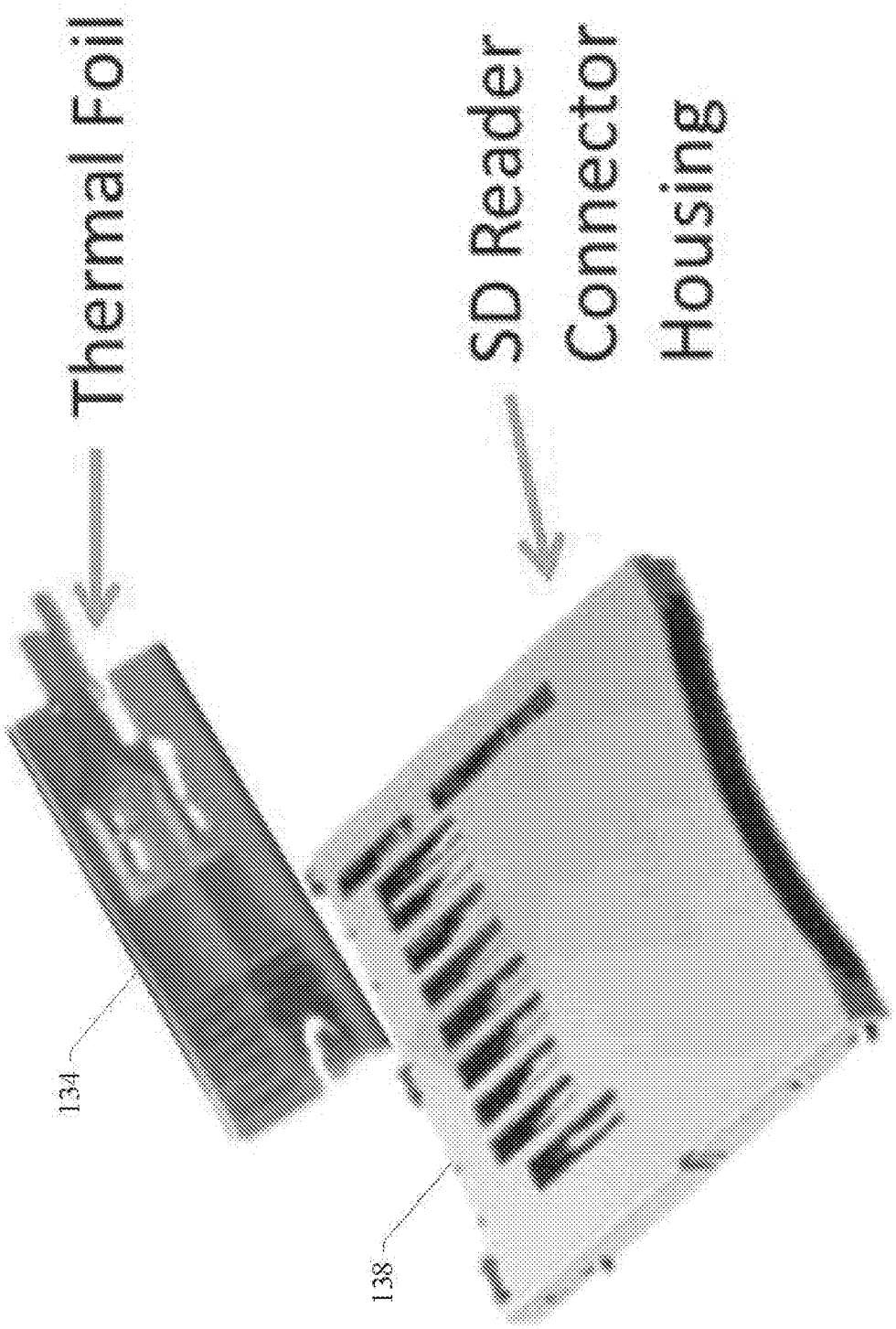


Fig. 3

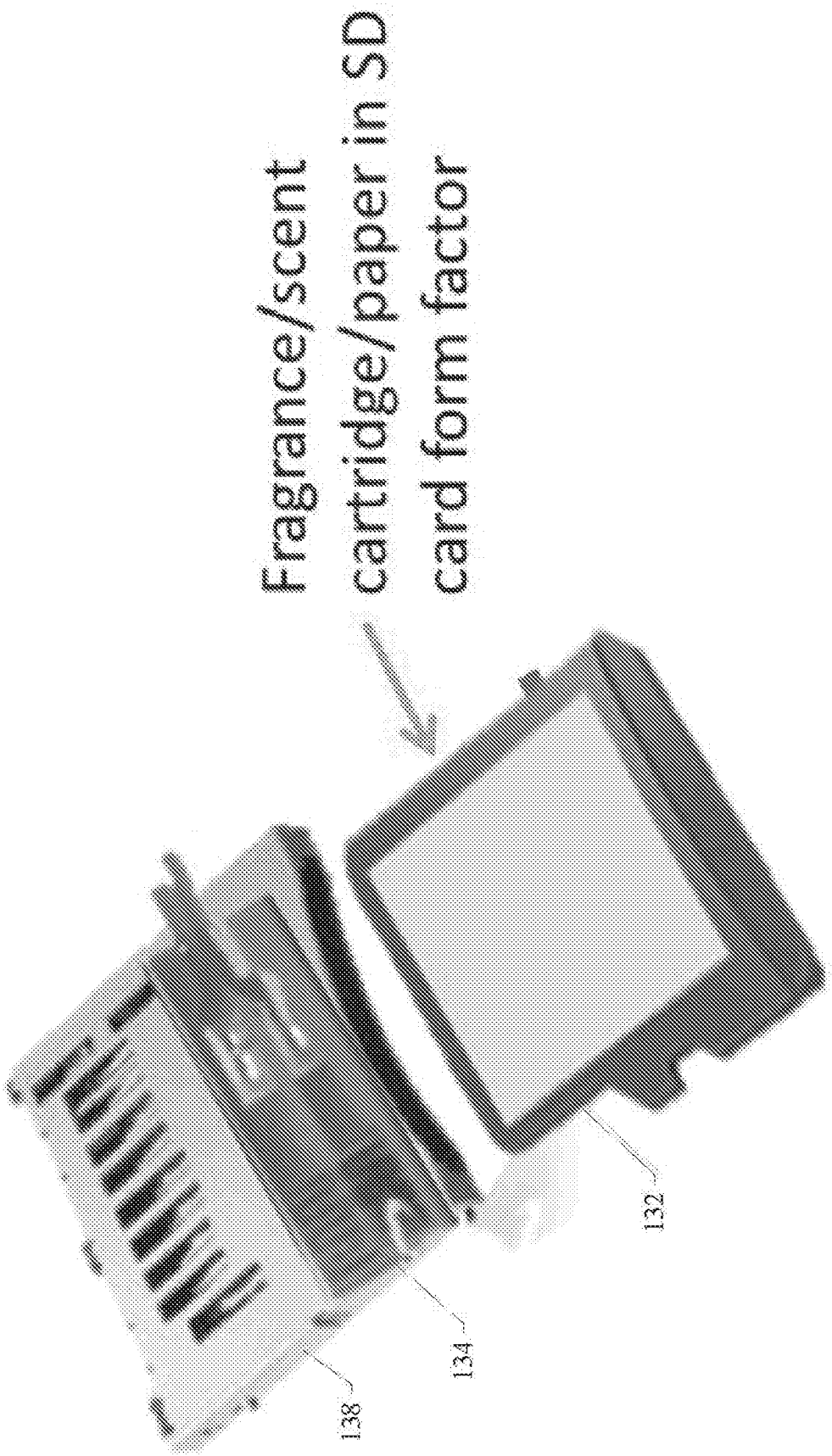

Fragrance/scent cartridge/paper in SD card form factor
138
134
132

Fig. 4

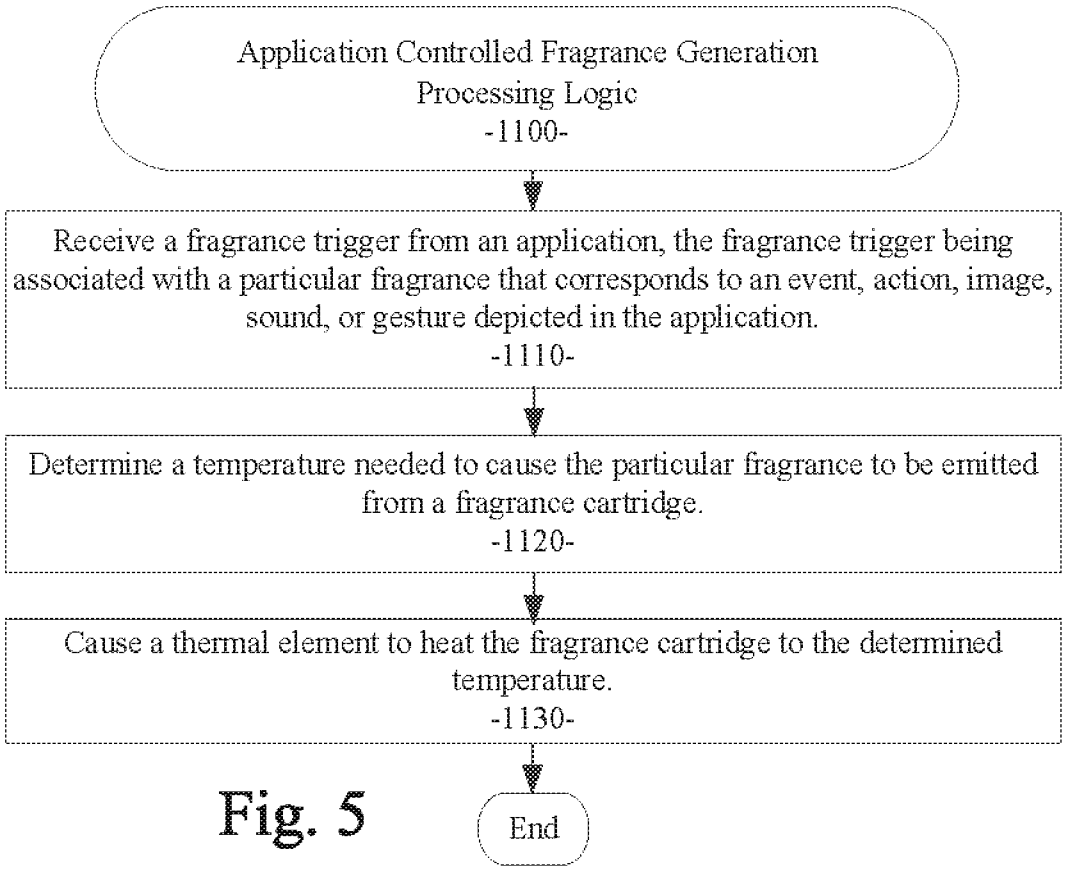

Application Controlled Fragrance Generation Processing Logic
-1100-
Receive a fragrance trigger from an application, the fragrance trigger being associated with a particular fragrance that corresponds to an event, action, image, sound, or gesture depicted in the application.
-1110-
Determine a temperature needed to cause the particular fragrance to be emitted from a fragrance cartridge.
-1120-
Cause a thermal element to heat the fragrance cartridge to the determined temperature.
-1130-
End

Fig. 5

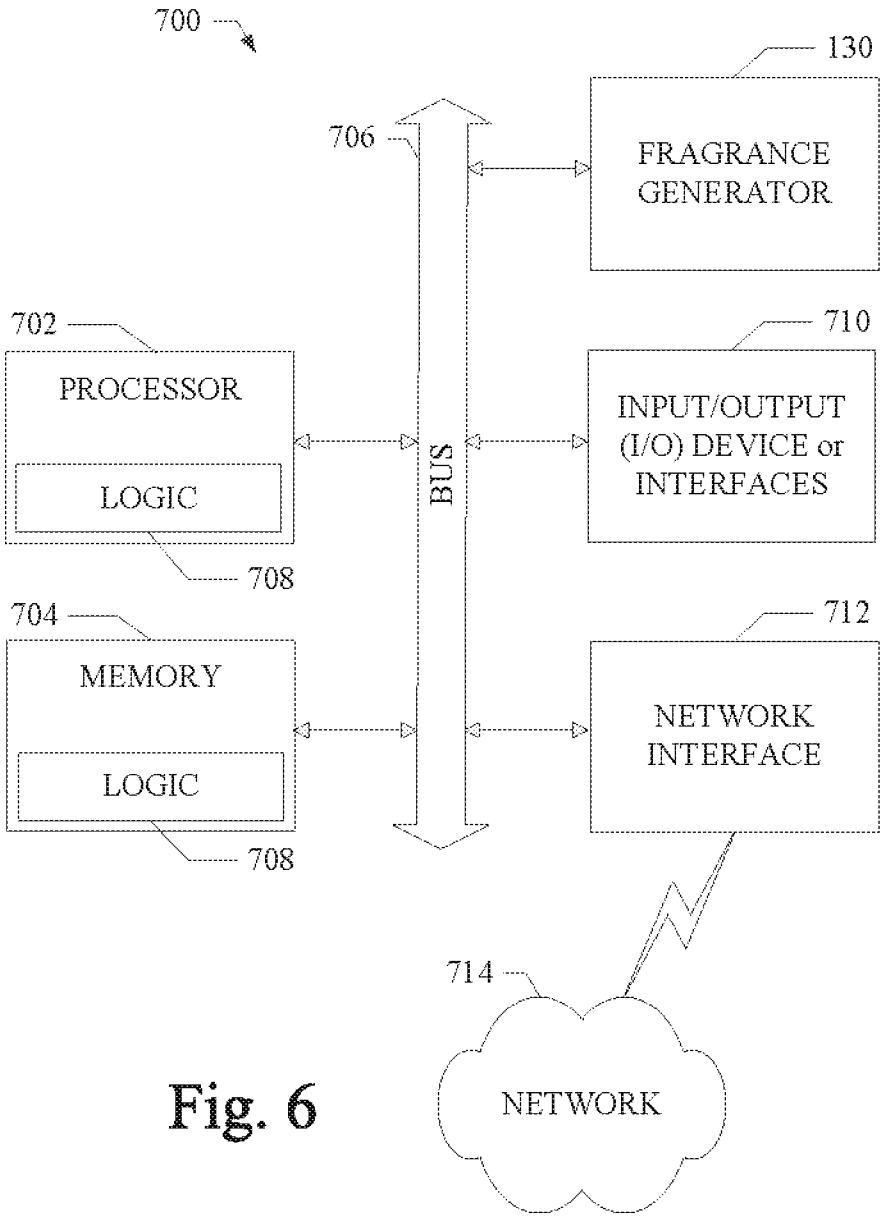

700
130
706
FRAGRANCE GENERATOR
702
PROCESSOR
LOGIC
708
710
INPUT/OUTPUT (I/O) DEVICE or INTERFACES
BUS
704
MEMORY
LOGIC
708
712
NETWORK INTERFACE
714
NETWORK

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/093432

A. CLASSIFICATION OF SUBJECT MATTER

H04M 1/725(2006.01)i; H04M 1/21(2006.01)i; A61L 9/03(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04M1/-, A61L9/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT;CNKI;EPODOC;WPI:INTEL, scent, fragranc?, smell, olfaction, fragrant, sweet+, odor, odour, flavor, flavour, generat???, diffus???, emit????, send???, sent, produc???, emanet???, dispens???, thermal, heat???, temperature, SD,sens???

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103685653 A (O2MICRO WUHAN CO., LTD.) 26 March 2014 (2014-03-26) description, paragraphs [0021]-[0062] and figures 1-8	1-25
X	CN 1484163 A (RENBAO COMP. IND. CO., LTD.) 24 March 2004 (2004-03-24) description, page 2, line 25 to page 9, line 3 and figures 1-6	1-25
X	CN 101459709 A (KONKA GROUP CO., LTD.) 17 June 2009 (2009-06-17) description, page 3, lines 1-29 and figures 1-3	1-25
X	JP 2002359671 A (NEC CORP.) 13 December 2002 (2002-12-13) description, paragraphs [0007]-[0031] and figures 1-10	1-25
X	JP 2009212891 A (SHARP KK.) 17 September 2009 (2009-09-17) description, paragraphs [0016]-[0043] and figures 1-6	1-25
A	CN 102158603 A (HUIZHOU TCL MOBILE COMM. CO., LTD.) 17 August 2011 (2011-08-17) the whole document	1-25

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 August 2015	**02 September 2015**

Name and mailing address of the ISA/CN	Authorized officer
STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088, China**	**CUI,Yingying**
Facsimile No. **(86-10)62019451**	Telephone No. **(86-10)62413531**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/093432

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 103475938 A (SHENZHEN HAMPOO ELECTRONIC TECHNOLOGY DEV. CO., LTD.) 25 December 2013 (2013-12-25) the whole document	1-25

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/093432

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 103685653 A	26 March 2014	None	
CN 1484163 A	24 March 2004	CN 1264101 C	12 July 2006
CN 101459709 A	17 June 2009	None	
JP 2002359671 A	13 December 2002	JP 4336867 B2	30 September 2009
JP 2009212891 A	17 September 2009	None	
CN 102158603 A	17 August 2011	None	
CN 103475938 A	17 August 2011	None	