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(54) **VIDEO GAME CONTROLLER WITH COOLING**

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(76) Inventors: **Herschel Naghi**, Beverly Hills, CA (US); **Amir Navid**, Sherman Oaks, CA (US); **Craig S. Erickson**, Stevenson Ranch, CA (US)

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Correspondence Address:  
**CHRISTIE, PARKER & HALE, LLP**  
**PO BOX 7068**  
**PASADENA, CA 91109-7068 (US)**

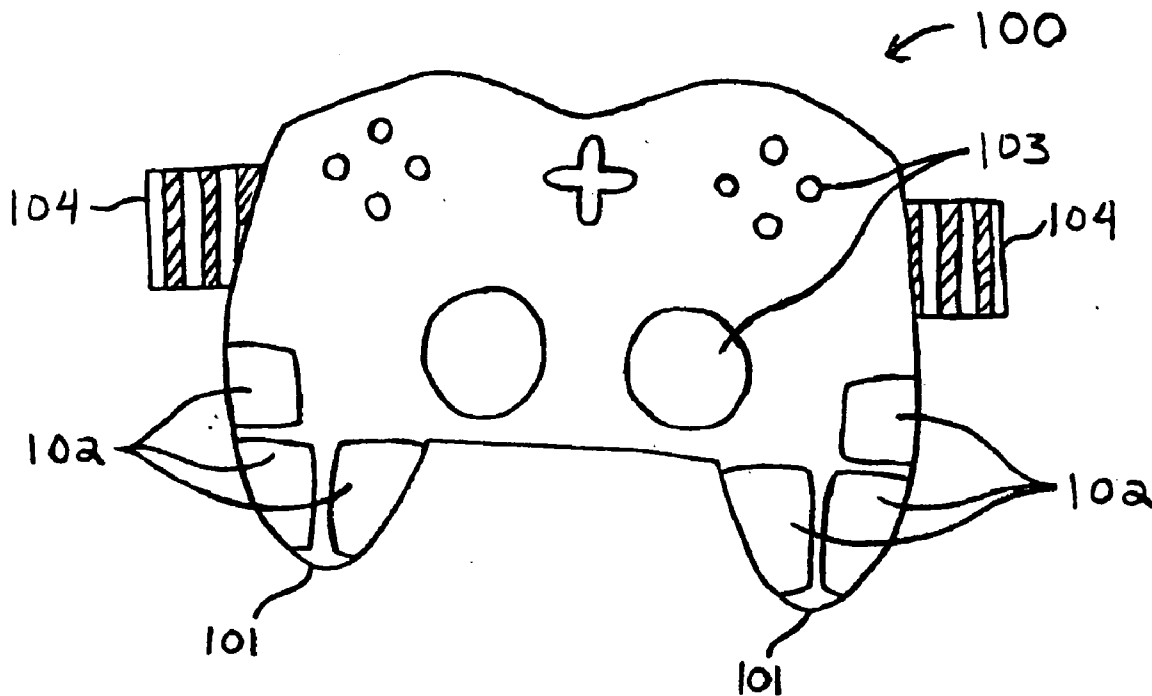
(57) **ABSTRACT**

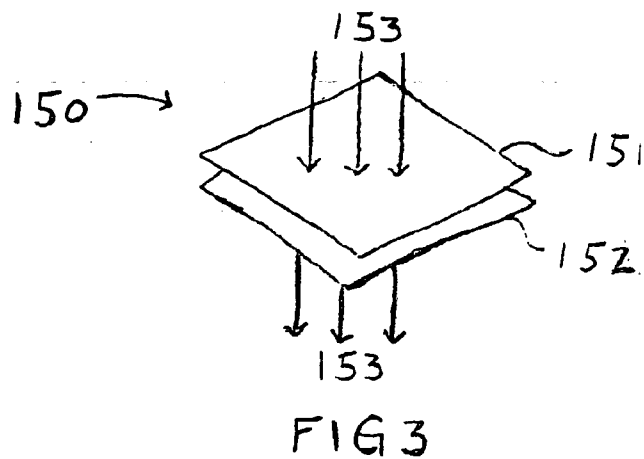
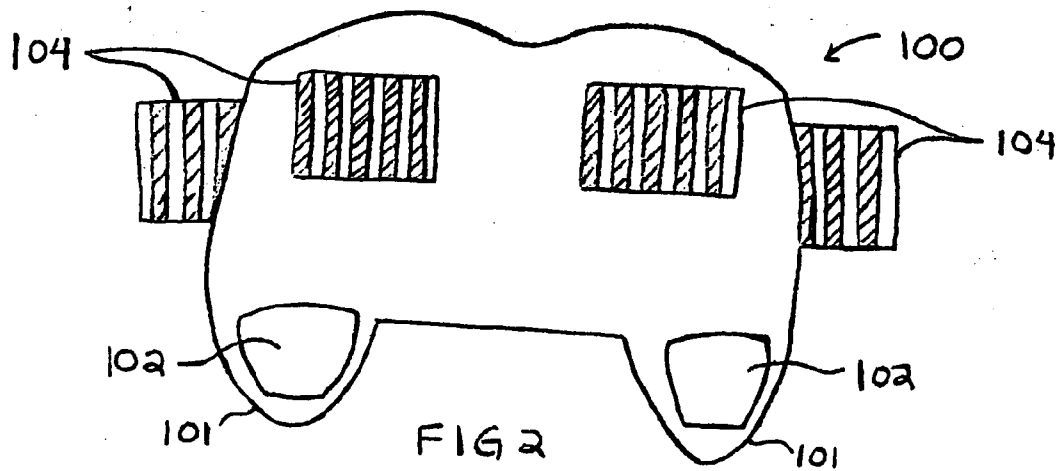
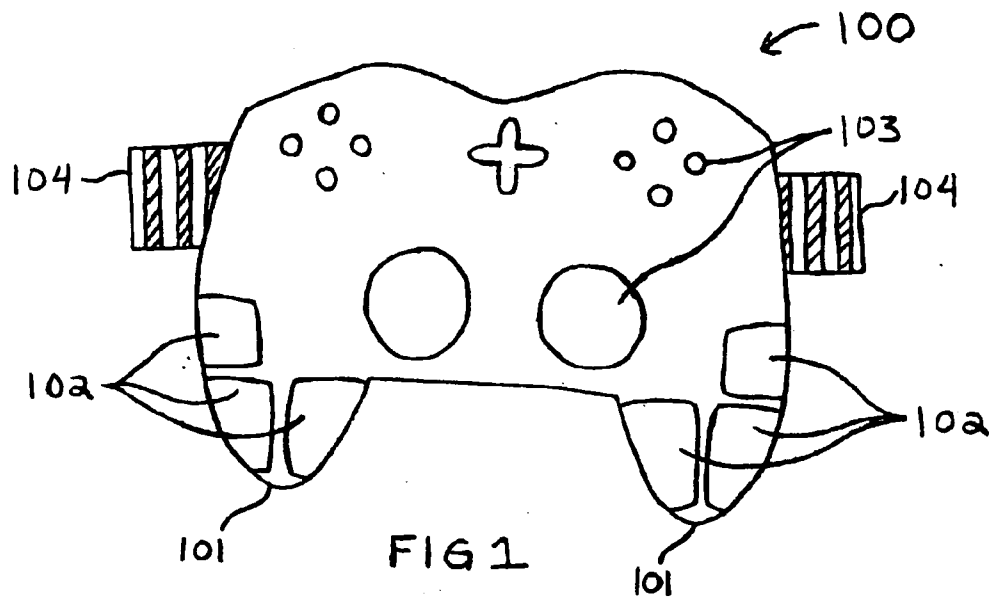
A hand-held video game controller includes a suitable conductor of heat, such as aluminum or copper, disposed on a surface of its hand grips. The heat conductor may be in the form of one or more metal plates at one or more locations on the surface of the hand grips. The metal plates may be perforated and/or may have any suitable shape to enhance cooling characteristics. The video game controller may also include a thermoelectric cooling (TEC) system or a liquid circulation system to enhance cooling, and may have a radiator for dissipating heat to outside of the video game controller.

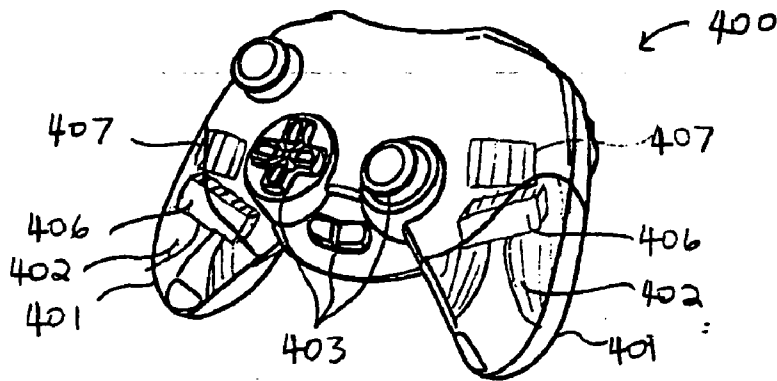
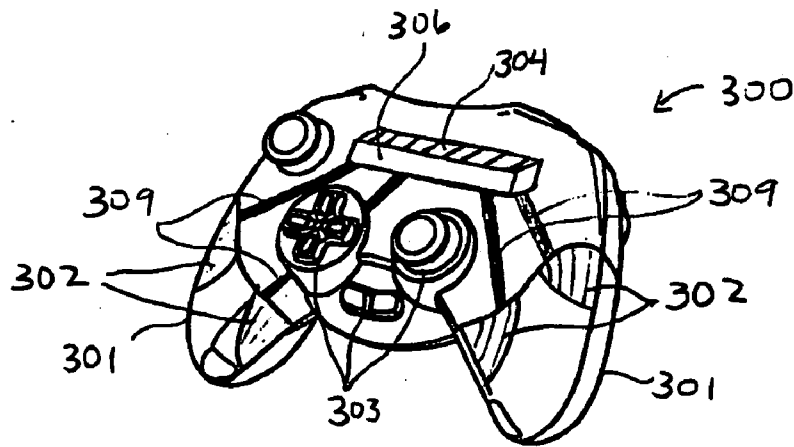
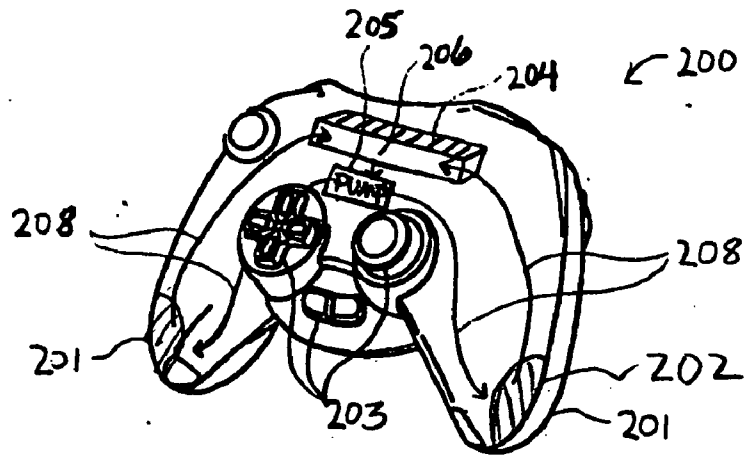
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**Related U.S. Application Data**

(60) Provisional application No. 60/704,696, filed on Aug. 1, 2005.







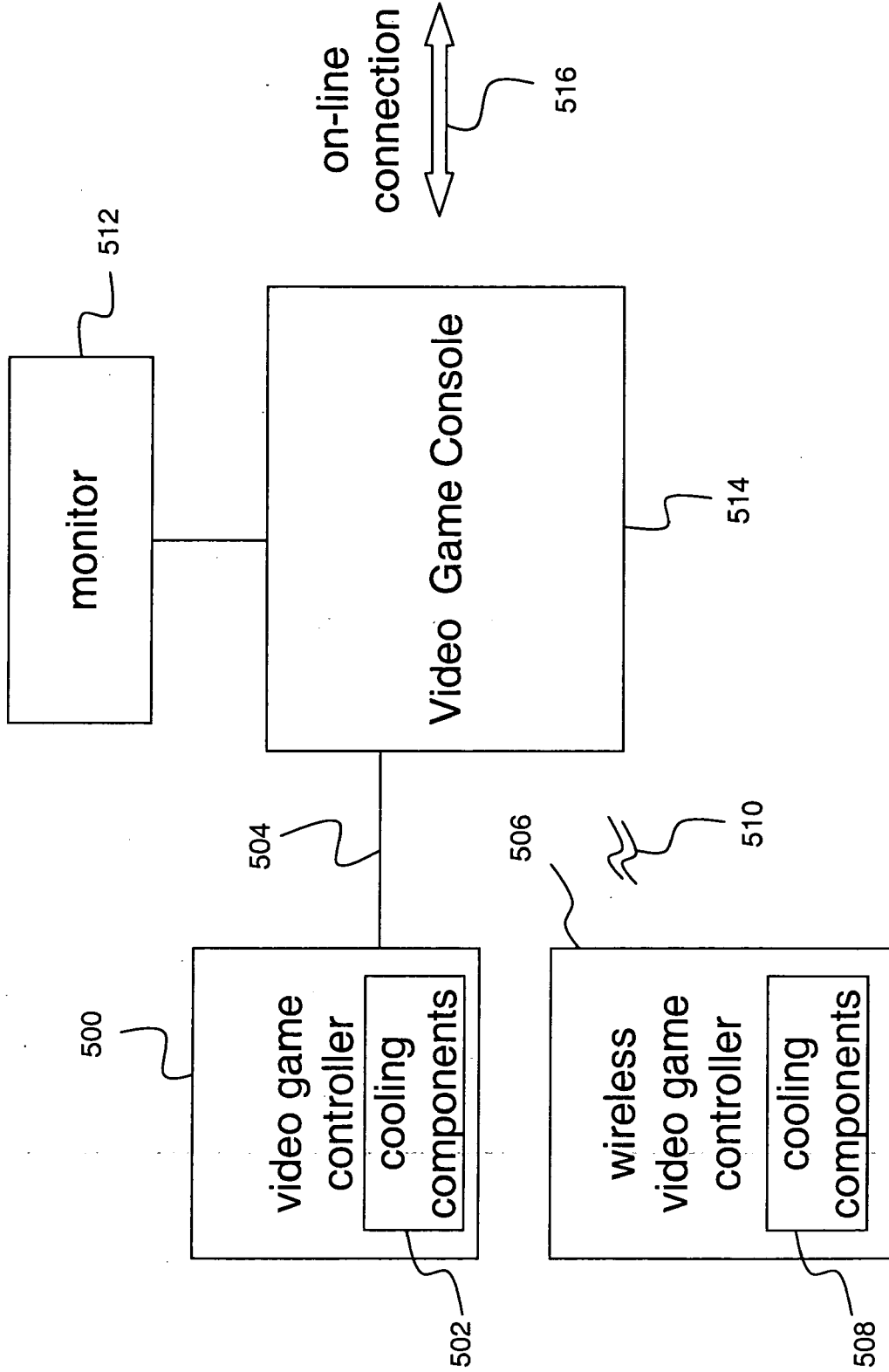


FIG. 7

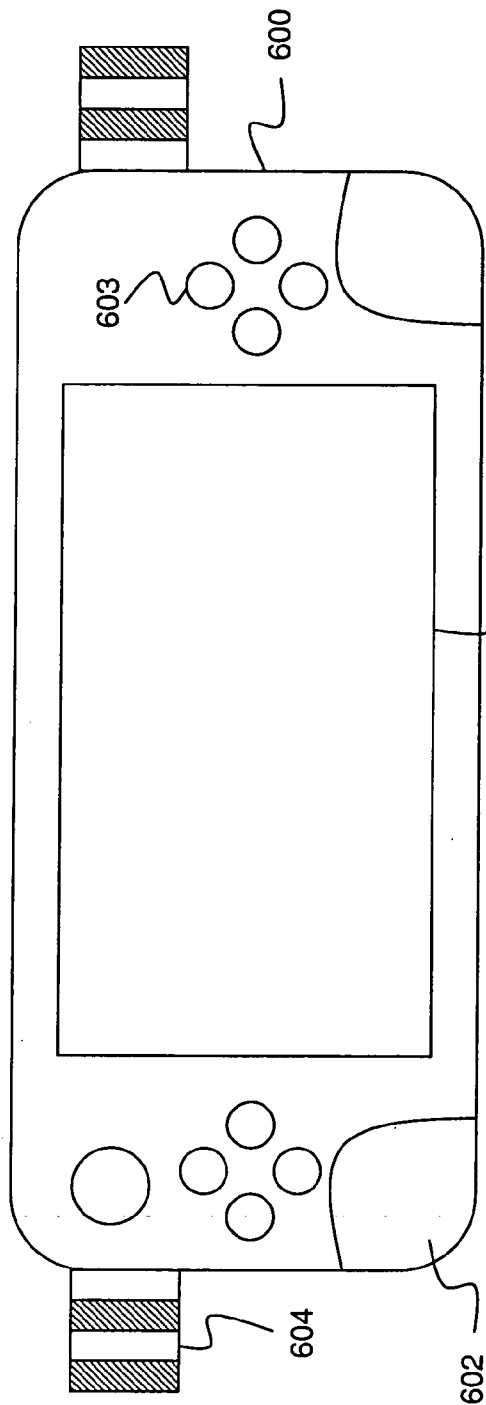


FIG. 8

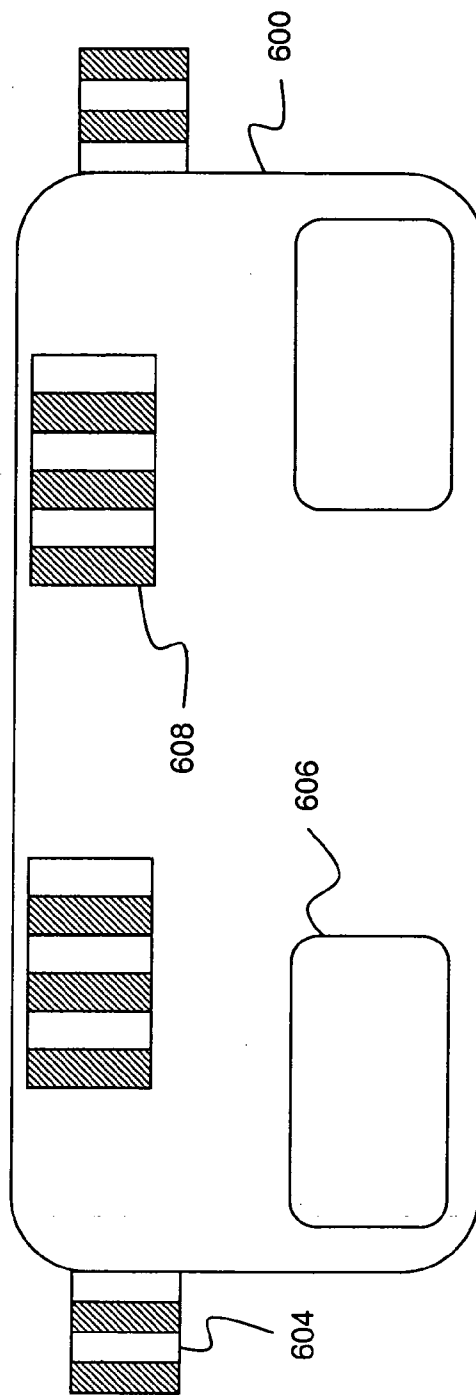


FIG. 9

**VIDEO GAME CONTROLLER WITH COOLING**

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims priority to and the benefit of U.S. Provisional Patent Application No. 60/704,696 filed Aug. 1, 2005, the entire content of which is incorporated by reference herein.

FIELD OF THE INVENTION

[0002] The present invention relates to video game controllers, and more particularly to a video game controller with cooling.

BACKGROUND

[0003] While playing video games with hand-held controllers, players often find that their hands become sweaty and hot. Whether single- or multi-player, video games are by their nature competitions, and a competitive environment causes players to become tense and nervous as they play. Video games with hand-held controllers also require significant physical dexterity from the hand muscles, as the players have to make repeated quick movements with the thumbs and fingers while holding onto the controller. The physical exertion of playing combined with the muscle tension and mental anxiety of competition can cause a player's hands to sweat.

[0004] Sweaty hands are uncomfortable and distracting, and are detrimental to video game play because they can cause players to make mistakes when they lose grip of the hand controller. Conventional video game controllers generally do not provide capabilities for dissipating the heat produced by the player's hands. Consequently, players must either play through the game with sweaty hands or let go of the controller during the game in order to wipe their hands dry. Either way, sweaty hands interfere with a player's optimal performance and detract from the enjoyment of the video game.

[0005] Therefore, it is desirable to provide an apparatus and method for cooling a player's hands while using a video game controller to play video games.

SUMMARY

[0006] In one exemplary embodiment according to the present invention, a video game controller includes: a housing; a plurality of game control elements disposed on the housing and adapted to be used by a user to control a video game; at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.

[0007] In another exemplary embodiment according to the present invention, a hand-held video game device includes: a housing; a display screen mounted on the housing for displaying a video game; a plurality of game control elements disposed on the housing and adapted to be used by a user to control the video game; at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game device.

[0008] In yet another exemplary embodiment according to the present invention, a video game system includes: a video game console; a monitor coupled to the video game console for displaying a video game; and at least one video game controller adapted to be used by a user to control the video game. The video game controller includes: a housing; a plurality of game control elements disposed on the housing, the game control elements for controlling the video game; at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.

[0009] In yet another exemplary embodiment according to the present invention, a video game controller includes: a housing; a plurality of game control elements disposed on the housing and adapted to be used by a user to control a video game; liquid disposed inside the housing and adapted to carry heat from palms of the user; and at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.

[0010] In yet another exemplary embodiment of the present invention, a video game controller includes: a housing having an external surface, at least a portion of the external surface being made of a heat conducting material, such that the housing promotes dissipation of heat from palms of a user; and a plurality of game control elements disposed on the housing and adapted to be used by the user to control a video game.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] These and/or other aspects and features of various embodiments of the invention will become apparent and more readily appreciated from the following description of examples of embodiments, taken in conjunction with the accompanying drawings of which:

[0012] FIG. 1 is a schematic front view of a hand-held video game controller in an exemplary embodiment of the present invention;

[0013] FIG. 2 is a schematic rear view of a hand-held video game controller of FIG. 1;

[0014] FIG. 3 is a conceptual diagram of a thermoelectric cooling device in an exemplary embodiment of the present invention;

[0015] FIG. 4 is a schematic perspective view of a hand-held video game controller in another exemplary embodiment of the present invention;

[0016] FIG. 5 is a schematic perspective view of a hand-held video game controller in yet another exemplary embodiment of the present invention;

[0017] FIG. 6 is a schematic perspective view of a hand-held video game controller in yet another exemplary embodiment of the present invention;

[0018] FIG. 7 is a block diagram of a video game system in an exemplary embodiment of the present invention; and

[0019] FIGS. 8 and 9 are schematic front and rear views of a hand-held video game unit in an exemplary embodiment of the present invention.

## DETAILED DESCRIPTION

[0020] In exemplary embodiments of the present invention, a hand-held video game controller with cooling is provided. The cooling may be provided by a passive element such as a heat sink and/or an active cooling element. By way of example, the hand-held video game controller may have a thermoelectric cooling (TEC) system using a Peltier junction.

[0021] In an exemplary embodiment of the present invention, a suitable conductor of heat, such as aluminum or copper, is disposed on a surface of the hand grips of a hand-held video game controller. The heat conductor may be in the form of one or more metal plates at one or more locations on the surface of the hand grip. The metal plates may be perforated and/or may have any suitable shape to enhance cooling characteristics.

[0022] A TEC device may be located below the heat conductor. One surface of the TEC device may be connected to the heat conductor on the hand grip, and the other surface may be connected to a radiator via another suitable conductor of heat, such as copper or liquid.

[0023] When the player's hand touches the hand grip, heat from the hand is conducted through the heat conductor on the surface of the hand grip to the TEC device and further to the radiator. Heat is thus drawn away from the hand grip, keeping the player's hands cool. As such, the temperature of the hand grip may be controlled without requiring a flow of air. In other embodiments, the flow of air may be used concurrently with the cooling through heat conduction. The heat conductive grip surface can also be perforated to allow for air circulation. The air circulation may not necessarily be a forced airflow, but may be a natural airflow that allows the hands to breath naturally.

[0024] In another exemplary embodiment of the present invention, a video game controller is at least partly filled with liquid, and includes a radiator, wherein heat from a hand grip of the video game controller is conducted to the radiator through circulation of the liquid. The video game controller includes a pump for circulating the liquid through the hand grip to the radiator.

[0025] In yet another exemplary embodiment of the present invention, a video game controller includes a Peltier device for cooling. The video game controller includes at least one conductive rod for conducting heat from a hand grip of the video game controller to the Peltier device. The video game controller has a radiator disposed proximately to the Peltier device for dissipating heat to outside of the video game controller.

[0026] In yet another exemplary embodiment of the present invention, a video game controller includes a plurality of Peltier devices, at least one per each hand grip of the video game controller. A grate is disposed proximately to each of the Peltier devices to facilitate heat dissipation.

[0027] Those skilled in the art would know how to integrate the cooling components/features/functions according to embodiments of the present invention to a conventional hand-held video game controller based on the disclosure of the present application.

[0028] FIG. 1 is a schematic front view of a hand-held video game controller 100 in an exemplary embodiment of

the present invention. While the video game controller 100 is depicted as a standard hand-held video game controller, the principles of the present invention may be applied to any video game controller, such as, for example, a control pad, a steering wheel, a mouse, a joystick, and/or any other suitable hand-held video game control device. Further, the principles of the present invention may be applied to hand-held video game units (shown in FIGS. 8 and 9, for example).

[0029] The video game controller 100 is coupled to a game console (shown in FIG. 7, for example), which may be a personal computer or a dedicated video game console such as XBOX®, XBOX 360™, PLAYSTATION®, PLAYSTATION 2®, PLAYSTATION 3™, NINTENDO 64®, or the like. The video game controller 100 has hand grips 101. A heat conductor 102 is disposed on the surface of the grips 101 at one or more locations. The heat conductor 102 may be in the form of one or more metal plates made of a suitable heat conducting metal (or other suitable material) such as copper, aluminum or even a liquid to take the heat away for transfer. In one embodiment, the heat conductor 102 has perforations or holes formed thereon. The video game controller 100 has disposed thereon a number of control elements 103 such as buttons, switches, joysticks, keys, dials and/or the like for receiving input from the user.

[0030] FIG. 2 is a schematic rear view of a hand-held video game controller 100 in an exemplary embodiment of the present invention. The video game controller 100 has hand grips 101. The heat conductor 102 is disposed on the surface of the grips 101 at one or more locations. One or more radiators 104 are also disposed on the video game controller 100, and functions as a heat sink. The radiators 104 can be mounted on the sides of the controller 100 and/or at the back (or rear) of the controller 100 and/or on any suitable location on the controller 100 for radiation of heat generated by the hand and/or by the cooling system (e.g., a thermoelectric cooling device). By way of example, in other embodiments, video game controllers may include one or more radiators located at front, sides and/or rear of the video game controller.

[0031] In other embodiments, substantially the entire housing (or the external surface of the housing) of the video game controller may be made of any suitable heat conducting/dissipating material such as copper, aluminum, any other suitable metal, or any combination of such metals. In still other embodiments, the housing or the external surface thereof may be made partly of such suitable material and partly of other materials such as plastic. In still other embodiments, the housing for the video game controller may include a number of heat conductors or heat conductive surfaces disposed on its external skin or surface. The heat conductors or heat conductive surfaces may be made of any suitable heat conducting/dissipating material such as copper, aluminum, any other suitable metal, or any combination of such metals. In these embodiments, radiators may not be needed or used.

[0032] FIG. 3 is a conceptual diagram of a thermoelectric cooling (TEC) device 150 in an exemplary embodiment of the present invention. The manufacture and operation of TEC devices are known to those skilled in the art, and will not be discussed in detail herein. The TEC device 150 may have roughly a size of a large postage stamp (e.g., 2.5 cm×4 cm) and may have a thickness of 1/8 inch (~0.32 cm).

[0033] One surface 151 of the thermoelectric device 150 is connected to the heat conductor 102 (see FIGS. 1 and 2), for example. The other surface 152 of the thermoelectric device 150 is connected to the radiator 104 (see FIGS. 1 and 2) via a conductor such as copper, aluminum or liquid. Heat 153 from the video game player's hand is passed through the heat conductor 102 to the surface 151 of the thermoelectric device 150. The heat 153 is then passed through the surface 152 to the radiator 104. This process cools the surface 151, the conductor 102, and the video game player's hands.

[0034] FIG. 4 is a schematic perspective view of a hand-held video game controller 200 in an exemplary embodiment of the present invention. The video game controller 200 has hand grips 201, and has a number of control elements 203 mounted on its external surface. A small pump 205 is provided to circulate liquid through the hand grips 201. The liquid circulation is depicted as arrows 208 in FIG. 4. In other embodiments, the hand-held video game controller containing liquid may not include a pump, but may use the properties of the liquid for cooling.

[0035] The liquid 208 carries heat from the hand grips 201 to a Peltier device 206. In the described embodiment, the video game controller 200 also includes heat conductive surfaces (e.g., made of metal such as aluminum or copper) 202 located at hand grips 201 for transferring heat from the palms of the player's hands to the liquid 208. In other embodiments, the video game controller containing liquid may not include heat conductive surfaces located at the hand grips 201.

[0036] The Peltier device 206 passes the heat to a radiator 204 for dissipation to outside of the video game controller 200. The radiator 204 may be in the form of a series of cooling fins. The liquid 208 may be any suitable coolant, and the pump 205 may also be referred to as a coolant pump. In other embodiments, the hand-held video game controller with cooling using liquid circulation, may not include heat conductive surfaces or heat conductors.

[0037] The liquid may be filled within the shell or housing of the video game controller 200, and the electronic components within the video game controller 200 may be isolated from the liquid through any suitable "water proofing" methods. Alternatively, the video game controller 200 may include a reservoir having a separate housing within the external housing of the video game controller 200, such that the liquid does not create a short or any other problems for the electronic components of the video game controller 200.

[0038] While some of the components of the video game controller 200 are visible in FIG. 4, they may actually have been installed below the external surface of the video game controller 200. By way of example, the pump 205 may be installed within the external housing of the video game controller 200. Also, the Peltier device 206 may be installed underneath the external surface of the video game controller 200. These components are illustrated in FIG. 4 for illustrative purposes only for ease of description. In some embodiments, of course, the external housing of the video game controller 200 may be made of a clear or transparent material such that internal components are visible through the housing.

[0039] FIG. 5 is a schematic perspective view of a hand-held video game controller 300 in yet another exemplary

embodiment of the present invention. The video game controller 300 has hand grips 301, and has a number of control elements 303 mounted on its surface. A number of heat conductive surfaces or materials 302 (e.g., made of metal such as aluminum or copper) are formed on the surface of the hand grips 301 so as to conduct heat from the palms of the player's hands.

[0040] Conductive rods 309 extend from the hand grips 301 (e.g., from the heat conductive surfaces 302) to a Peltier device 306. The Peltier devices in this and other embodiments may also be referred to as thermoelectric coolers (TECs). The conductive rods 309 may be made of any suitable conductive material, such as aluminum or copper, or may be any other suitable conductive rods or any other shaped structures or devices. The conductive rods 309 carry heat from the hand grips 301 to the Peltier device 306. The Peltier device 306 passes the heat to the radiator 304, which may have a number of cooling fins for dissipating heat to outside of the video game controller 300.

[0041] Similar to FIG. 4, a number of components illustrated in FIG. 5 may have been implemented within the exterior housing of the video game controller 300. By way of example, the conductive rods 309 and the Peltier device 306 may be located internally to the video game controller 300, and are shown for illustrative purposes only for ease of description. The cooling fins of the radiator 304 may be disposed on the external surface of the video game controller 300. In some embodiments, of course, the external housing of the video game controller 300 may be made of a clear or transparent material such that internal components are visible through the housing.

[0042] FIG. 6 is a schematic perspective view of a hand-held video game controller 400 in yet another exemplary embodiment of the present invention. The video game controller 400 has hand grips 401, and has a number of control elements 403 mounted on its surface. In this embodiment, two Peltier devices 406 are provided, one at each hand grip 401. Conductive materials or surfaces 402 are disposed on the hand grips 401. The conductive materials 402, which may be made of any suitable material such as aluminum or copper, respectively carry heat from the hand grips 401 to the Peltier devices 406. Grates 407 are provided near each of the Peltier devices 406 to facilitate heat dissipation.

[0043] Similar to FIGS. 4 and 5, a number of components illustrated in FIG. 6 may have been implemented within the exterior housing of the video game controller 400. By way of example, the Peltier devices 406 may be located internally to the video game controller 400, and are shown for illustrative purposes only for ease of description. The grates 407 are formed on the exterior surface of the video game controller 400 proximately to the respective Peltier devices. In some embodiments, of course, the external housing of the video game controller 400 may be made of a clear or transparent material such that internal components are visible through the housing.

[0044] FIG. 7 is a block diagram of a video game system that includes hand-held video game controllers with cooling 500 and 506. The video game controllers with cooling 500 and 506 each include cooling components 502, 508 such as heat conducting surfaces, TEC device, heat conducting liquid and pump, heat conductive rods, a radiator (e.g., grate or cooling fins) and/or the like. The video game controllers



500 and 506 may, for example, be any of the hand-held video game controllers 100, 200, 300 or 400, of FIGS. 1-2 and 4-6.

[0045] The video game controller 500 interfaces with a video game console 514 via a video game cable 504, while the video game controller 506 interfaces with the video game console 514 via a wireless connection 510. The video game console 514 may be any of XBOX®, XBOX 360™, PLAYSTATION®, PLAYSTATION 2®, PLAYSTATION 3™, NINTENDO 64®, or any other suitable video game console or a computer running a video game software. The players interface with the video game console 514 using the video game controllers 500, 506 in accordance with game content displayed on a monitor 512. The players may also interface with other video game consoles and/or other players via an on-line connection 514.

[0046] Referring to FIGS. 8 and 9, a hand-held video game device or video game unit 600 includes a display screen 601 on which video game content is displayed. A player controls the video game device 600 using control elements 603. Heat conductors or heat conducting surfaces 602 are disposed on the surface of the video game device 600 at locations where the player would hold onto the video game device 600. The heat conductors 602 may be in the form of one or more metal plates made of a suitable heat conducting metal (or other suitable material) such as copper or aluminum.

[0047] In addition to the heat conducting surfaces 602 for carrying heat away from the palms of the player's hands, the hand-held video game device 600 includes one or more radiators (e.g., grate or cooling fins) 604, 608 for radiating heat (including heat carried from the palms of the player's hands) from the video game device 602. As can be seen in FIGS. 8 and 9, the hand-held video game device 600 includes the radiators 604 located at sides of the video game device, as well as the radiators 608 located on the rear side of the video game device. In other embodiments, hand-held video game devices may include one or more radiators located at front, sides and/or rear of the hand-held video game device. The hand-held video game device 600, similar to the video game controllers 100, 200, 300 or 400 of FIGS. 1-2 and 4-6, includes internal cooling components such as TEC device, heat conducting liquid and pump, heat conductive rods, and/or the like for conducting heat from the heat conducting surfaces 602, 606 to the radiator 604, 608 for radiating heat.

[0048] Those skilled in the art would know how to integrate the cooling components/features/functions according to embodiments of the present invention to a conventional hand-held video game device based on the disclosure of the present application.

[0049] It will be appreciated by those with ordinary skill in the art that the invention can be embodied in other specific forms without departing from the spirit or essential character thereof. The embodiments described above should be considered to be illustrative and not restrictive. The scope of the present invention is defined by the attached claims and their equivalents.

What is claimed is:

- 1. A video game controller comprising:
  - a housing;

- a plurality of game control elements disposed on the housing and adapted to be used by a user to control a video game;
- at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and
- at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.
- 2. The video game controller of claim 1, further comprising heat transfer means adapted to transfer the heat from the at least one conductor to the at least one radiator.
- 3. The video game controller of claim 2, wherein the heat transfer means comprises at least one thermoelectric cooler (TEC).
- 4. The video game controller of claim 2, wherein the heat transfer means comprises at least one heat conducting rod.
- 5. The video game controller of claim 4, wherein the heat transfer means further comprises at least one thermoelectric cooler (TEC) adapted to transfer the heat from the at least one heat conducting rod to the at least one radiator.
- 6. The video game controller of claim 2, wherein the heat transfer means comprises heat transferring liquid, and wherein the video game controller further comprises a pump for circulating the heat transferring liquid within the video game controller.
- 7. The video game controller of claim 6, wherein the heat transfer means further comprises at least one thermoelectric cooler (TEC) adapted to transfer the heat from the heat transferring liquid to the at least one radiator.
- 8. The video game controller of claim 1, wherein the at least one radiator comprises at least one of a grate or fins.
- 9. The video game controller of claim 1, wherein the at least one heat conductor is made of at least one of aluminum or copper.
- 10. The video game controller of claim 1, wherein the at least one heat conductor has perforations formed thereon.
- 11. A hand-held video game device comprising:
  - a housing;
  - a display screen mounted on the housing for displaying a video game;
  - a plurality of game control elements disposed on the housing and adapted to be used by a user to control the video game;
  - at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and
  - at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game device.
  - 12. The hand-held video game device of claim 11, wherein the at least one radiator comprises at least one of a grate or fins.
  - 13. The hand-held video game device of claim 11, wherein the at least one heat conductor is made of at least one of aluminum or copper.
  - 14. A video game system comprising:
    - a video game console;
    - a monitor coupled to the video game console for displaying a video game; and

at least one video game controller adapted to be used by a user to control the video game, the video game controller comprising:

a housing;

a plurality of game control elements disposed on the housing, the game control elements for controlling the video game;

at least one heat conductor disposed on the housing and adapted to carry heat from palms of the user; and

at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.

**15.** The video game system of claim 14, wherein the at least one video game controller includes a wireless video game controller.

**16.** The video game system of claim 14, wherein the at least one video game controller includes a wired video game controller.

**17.** The video game system of claim 14, wherein the at least one video game controller includes cooling components adapted to transfer the heat from the at least one heat conductor to the at least one radiator.

**18.** The video game system of claim 14, wherein the video game console is adapted to communicate with one or more other video game consoles via an on-line connection.

**19.** A video game controller comprising:

a housing;

a plurality of game control elements disposed on the housing and adapted to be used by a user to control a video game;

liquid disposed inside the housing and adapted to carry heat from palms of the user; and

at least one radiator disposed on the housing and adapted to dissipate the heat to outside of the video game controller.

**20.** The video game controller of claim 19, further comprising a pump adapted to circulate the liquid within the housing, so as to carry the heat from the palms of the user to the at least one radiator.

**21.** A video game controller comprising:

a housing having an external surface, at least a portion of the external surface being made of a heat conducting material, such that the housing promotes dissipation of heat from palms of a user; and

a plurality of game control elements disposed on the housing and adapted to be used by the user to control a video game.

**22.** The video game controller of claim 21, wherein substantially the entire external surface of the housing is made of the heat conducting material.

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