A mobile computer includes a housing, an electrical connector located on the housing and a game controller. The game controller is detachably connected to the housing and includes a main body, a connection assembly and a connector. The connection assembly is rotatably connected to the main body. The connector is located within the connection assembly, and is electrically connected to the electrical connector of the mobile computer. The game controller is rotatably connected to the mobile computer through the connection assembly, and the game controller communicates with the mobile computer through the connector and the electrical connector.
FIG. 1
FIG. 4
GAME CONTROLLER AND MOBILE COMPUTER THEREOF

BACKGROUND

[0001] 1. Technical field

[0002] The disclosure generally relates to a game controller and a mobile computer employing the game controller.

[0003] 2. Description of the Related Art

[0004] Mobile computers such as tablet computers or tablets are widely used and are operable to play games, send e-mails, and edit images by a touch screen and a virtual keyboard. For example, touch function of the tablet computer makes navigation easier than the use of keyboard and mouse when users are playing games. However, when the users need to frequently operate the touch screen or the virtual keypad, the fingers of the users may block part of the screen of the tablet computer, thus, affecting the viewing and operating experience.

[0005] Therefore, there is room for improvement within the art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of a game controller and a mobile computer thereof can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the game controller and mobile computer thereof. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views. Wherever possible, the same reference numbers are used throughout the drawings to refer to the same or like elements of an embodiment.

[0007] FIG. 1 is a schematic view of an assembled mobile computer including two game controllers, according to an exemplary embodiment of the disclosure.

[0008] FIG. 2 is an exploded view of the mobile computer shown in FIG. 1.

[0009] FIG. 3 is similar to FIG. 1, but viewed from another angle.

[0010] FIG. 4 is a block view of a control system of the game controller shown in FIG. 1.

[0011] FIG. 5 is a schematic view of the mobile computer, showing the game controllers rotated to a suitable position for support the mobile computer.

DETAILED DESCRIPTION

[0012] FIG. 1 is a schematic view of an assembled mobile computer including two game controllers 100, according to an embodiment of the disclosure. In the embodiment, the two game controllers 100 can be detachably assembled to opposite sides of a housing 220 of the mobile computer 200. Each game controller 100 can be rotated to a suitable angle or position relative to the housing 220 for holding the mobile computer 200 and forming a desired viewing angle.

[0013] Referring to FIG. 2, the housing 220 defines two mounting slots 210 at opposite sides thereof corresponding to the game controllers 100. A USB port 230 and a ventilation hole 250 adjacent to the USB port 230 are defined in each mounting slot 210. The USB port 230 is electrically connected to internal circuits in the mobile computer 200. The game controllers 100 are electrically and mechanically connected to the mobile computer 200 through the USB port 230. The housing 220 further defines a number of spaced air outlets 270 at each side of the housing 220 far away from a corresponding mounting slot 210.

[0014] Each game controller 100 can be used to control an object or a playable character in the mobile computer 200. Each game controller 100 includes a main body 10 and a connection assembly 30. The main body 10 includes a handle 11 and a fan 15 located within the main body 10. In order to facilitate operators to hold and operate the game controller 100, the handle 11 has a substantially convex curved shape or the like, and defines a curved groove 17.

[0015] The handle 11 can be a game pad and used to provide input. A number of keys 111 are arranged on the handle 11. The handle 11 can further be combined with one or more omnidirectional control sticks or buttons. A ventilating slot 131 is defined in the handle 11 far away from the keys 111. The fan 15 is detachably received within the ventilating slot 131.

[0016] Referring to FIG. 3, the main body 10 defines a plurality of air inlets 16 at the other surface of the handle 11 opposite to the keys 111. The air inlets 16 communicate with the ventilating slot 131 to provide air flow for the fan 15. The main body 10 further includes a plurality of operation buttons 19 that are used to control the fan 15 such as turning on/off, and rotational speed.

[0017] The connection assembly 30 includes a plug 31 and a strip 33. The plug 31 can be inserted in the mounting slot 210 of the mobile computer 200 to electrically connect the game controllers 100 to the mobile computer 200. The strip 33 is flexibly connected to one end of the handle 11, and the plug 31 is fixed on the strip 33. In this embodiment, the strip 33 can be made of flexible material that can bend or deform into a suitable shape and angle and maintain the deformed shape. Thus, when the plug 31 is inserted into the mounting slot 210, the main body 10 can connect the housing 220 through the flexible strip 33, the game controller 100 can be bent into a desired angle relative to the mobile computer 200 along the strip 33.

[0018] When the plug 31 inserts into the mounting slot 210 of the mobile computer 200, and the two game controllers 100 and the mobile computer 200 are coplanar. The plug 31 is aligned with the ventilating slot 131, and the fan 15 provides air flow that enters inside the mobile computer 200 through the plug 31 and the ventilating slot 131, to draw cooler air into the mobile computer 200 and remove warm air from inside.

[0019] Referring to FIG. 5, when the main bodies 10 rotate along the strip 33 to desired angles (e.g., 90 degrees) relative to the mobile computer 200, the two game controllers 100 can be implemented as two brackets to support and secure the mobile computer 200.

[0020] FIG. 4 is a block view of a control system 50 of the game controller 100. The control system 50 includes a microcontroller 51, a USB connector 52, a motor driver 53, a motor 54, a first sensor 55, and a second sensor 56. The keys 111, the operation buttons 19, the USB connector 52, the motor driver 53, the first sensor 55, and the second sensor 56 are electrically connected to the microcontroller 51.

[0021] The microcontroller 51 is a multipurpose and programmable device that can accept and process input signals, and provide results as output to control the connected peripheral devices, such as the USB connector 52, the motor driver 53, the first sensor 55, and the second sensor 56. The USB connector 52 is received within the plug 31, and is electrically connected to the internal circuits of the mobile computer 200.
through the USP port 230. Thus, the mobile computer 200 can transmit various instructions and receive input signals from the game controllers 100.

The motor driver 53 is electrically connected to the fan 15 through the motor 54. The motor driver 53 can transmit power to the motor 54 to control and adjust the rotational speed of the motor 54 under the control of the microcontroller 51. The motor 54 can produce or impart motion or power to the fan 15 to control the fan 15, such as start, stop, and speed control. Thus, when the different operation buttons 19 are operated, the microcontroller 51 controls the motor driver 53 to activate the motor 54 in accordance with command signals from the microcontroller 51, to further activate or stop the fan 15 or adjust the rotational speed of the fan 15.

Moreover, the microcontroller 51 can control and increase the rotational speed (e.g., twice or three times than the normal speed) of the motor 54 by pressing the corresponding operation buttons 19. Thus, the dust or other debris in the ventilating slot 131 and the mobile computer 200 can be conducted and expelled out through the air outlets 270. After a predetermined period of high-speed rotation of the fan 15 (e.g., 3-5 seconds), the microcontroller 51 automatically controls the motor 54 and the fan 15 to slow down and return to a normal rotational speed.

The first sensor 55 can be a piezoelectric pressure indicator which is positioned in the handle 11, and use piezoelectric effect to measure the strain upon the handle 11 due to applied pressure. When the game controllers 100 and the computer controller 200 are assembled together in coplanar, and the handles 11 are pressed to activate the first sensor 55, the first sensor 55 then sends a first control signal (e.g., electrical signal) to the microcontroller 51, the microcontroller 51 controls the motor 54 to activate the fan 15 and cool the mobile computer 200. When one or two game controllers 100 are used as brackets to support and secure the mobile computer 200 in a manner convenient for viewing the mobile computer 200, the first sensor 55 then sends a second control signal (e.g., electrical signal) to the microcontroller 51 to enable the fan 15 to stop rotating.

The second sensor 56 can be a temperature transducer or thermoelectric device that can measure temperature and convert the temperature to an output signal such as voltage signal. The second sensor 56 is positioned within the mobile computer 200. For example, the second sensor 56 can be located on the motherboard and close to the CPU or power supply, to detect the current temperature inside the mobile computer 200 in real-time. The microcontroller 51 controls and adjusts the rotational speed of the fan 15 in real-time according to the current temperature.

For example, when the second sensor 56 detects that the current temperature inside the mobile computer 200 gradually increases, the microcontroller 51 controls the motor 54 to increase the rotational speed of the fan 15. When the second sensor 56 detects that the internal temperature of the mobile computer gradually decreases, the microcontroller 51 controls the motor 54 to reduce the rotational speed of the fan 15 in real-time.

The rotational speed of the fan 15 can also be selectively controlled by the various operation buttons 19, and the operation buttons 19 can be implemented to start and stop the rotation of the fan 15. Moreover, one or more magnetic components (e.g., magnets) can be positioned on the handle 13 adjacent to the strip 33, and one or more magnetic components can be positioned on the housing 220 of the mobile computer 200 and aligned with the magnetic components on the main body 10. Thus, when the plug 31 is inserted into the mounting slot 210, the game controllers 100 are attractively connected to the mobile computer 200 by the magnetic components on the main body 10 and the housing 220.

In summary, the game controllers 100 are electrically connected to the mobile computer 200 through the USB port 230 and the USB connector 52 to provide input to the mobile computer 200, and there is no need to frequency operate the touch screen or the virtual keypad using the fingers of the users, which cannot block part of operable and useful seen and/or virtual keyboard of the mobile computer 200. In addition, the fans 15 of the game controllers 100 can provide air flow to the mobile computer 200 and expel out warm air to cool the mobile computer 200. Moreover, the game controllers 100 can be rotatably connected to the mobile computer 200 through the connection assembly 30, so the game controllers 100 can be used as brackets to support and secure the mobile computer 200 in a manner convenient for viewing the mobile computer 200, thus it is convenient for viewing the mobile computer 200.

In the present specification and claims, the word “a” or “an” preceding an element does not exclude the presence of a plurality of such elements. Further, the word “comprising” does not exclude the presence of elements or steps other than those listed.

It is to be understood, however, that even though numerous characteristics and advantages of the exemplary disclosure have been set forth in the foregoing description, together with details of the structure and function of the exemplary disclosure, the disclosure is illustrative only, and changes may be made in detail, especially in the matters of shape, size, and arrangement of parts within the principles of this exemplary disclosure to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A game controller comprising:
   a main body comprising:
      a plurality of keys arranged on the main body;
      a connection assembly for rotatably connecting to a mobile computer having an electrical connector; and
      a connector located within the connection assembly, wherein when the connector of the game controller is electrically connected to electrical connector of the mobile computer, the main body is electrically connected to the mobile computer through the connection assembly, and can be rotated into a desired angle relative to the mobile computer, and the plurality of keys output signals to the mobile computer through the connector and the electrical connector.
   2. The game controller as claimed in claim 1, wherein the main body further comprises a handle and a fan located in the main body, the plurality of keys are arranged on the surface of the handle, the handle defines a ventilating slot far away from the keys to receive the fan.
   3. The game controller as claimed in claim 2, wherein the main body further comprises a plurality of operation buttons and a plurality of air inlets at the surface of the handle opposite to the plurality of keys, the plurality of air inlets communicate with the ventilating slot to provide air entrance or intake for the fan, and the plurality of operation buttons control and adjust the rotational speed of the fan.
4. The game controller as claimed in claim 2, wherein the connection assembly comprises a plug and a strip, the plug is detachably connected to the mobile computer to achieve electrical communication between the game controller and the mobile computer, the strip is flexibly connected to one end of the handle, the plug is fixed on the strip, when is electrically connected to the mobile computer, the connection assembly is mechanically connected to the mobile computer, and the game controllers can be bent into a desired angle relative to the mobile computer along the strip.

5. The game controller as claimed in claim 4, wherein when the plug is inserted in the mobile computer, and is aligned with the ventilating slot, the air flow from the fan enters inside the mobile computer via the plug and the ventilating slot to expel warm air from inside the mobile computer and draw cooler air into the mobile computer; when the main body rotates along the strip to a desired angle relative to the mobile computer, the plug is electrically connected between the game controller and the mobile computer, and the game controller is implemented as bracket to support and secure the mobile computer in a manner convenient for viewing the mobile computer.

6. The game controller as claimed in claim 2, further comprising a control system, wherein the control system comprises a microcontroller, a motor driver and a motor electrically connected to the fan, the motor drive is electrically connected between the microcontroller and the motor, the motor drive transmits power to the motor to control and adjust the rotational speed of the motor under the control of the microcontroller, the motor imparts motion or power to the fan to control and adjust the rotational speed of the fan, and the dust in the ventilating slot and the mobile computer is conducted and expelled out.

7. The game controller as claimed in claim 6, wherein the control system further comprises a first sensor and a second sensor which are electrically connected the microcontroller, the first sensor is positioned in the handle and uses to measure the strain upon the handle due to applied pressure, the first sensor sends a control signal to the microcontroller due to pressure on the handle, the microcontroller controls the motor to activate the fan to output air flow to the mobile computer, the second sensor is positioned in the mobile computer, and measures current temperature inside the mobile computer, and the microcontroller controls and adjusts the rotational speed of the fan according to the current temperature inside the mobile computer.

8. A mobile computer comprising:
   a housing;
   an electrical connector located on the housing; and
   a game controller detachably connected to housing, the game controller comprising:
   a main body;
   a connection assembly rotatably connected to the main body; and
   a connector located within the connection assembly, wherein the connector is electrically connected to the electrical connector of the mobile computer, the main body is electrically connected to the mobile computer through the connection assembly and is rotated into a desired angle relative to the housing, and the game controller communicates with the mobile computer through the connector and the electrical connector.

9. The mobile computer as claimed in claim 8, wherein the housing defines a mounting slot corresponding to the game controller, the mounting slot defines a ventilation hole adjacent to the electrical connector, the electrical connector is a universal serial bus (USB) port and is received in the mounting hole and is electrically connected to internal circuits of the mobile computer, and the housing further defines a plurality of air outlets at the side of the housing far away from a corresponding mounting slot.

10. The mobile computer as claimed in claim 8, wherein the main body comprises a handle and a fan, the handle comprises a plurality of keys arranged on the surface of the handle, the main body defines a ventilating slot far away from the keys, and the fan is received within the ventilating slot.

11. The mobile computer as claimed in claim 10, wherein the main body further comprises a plurality of operation buttons and air inlets at the surface of the handle opposite to the plurality of keys, the plurality of air inlets communicate with the ventilating slot to provide air entrance for the fan, and the plurality of operation buttons control and adjust the rotational speed of the fan.

12. The mobile computer as claimed in claim 9, wherein the connection assembly comprises a plug and a strip, the plug is detachably inserted and connected to the mounting slot of the mobile controller to achieve electrical communication between the game controllers and the mobile computer, and the strip is flexibly connected to one end of the handle, the plug is fixed on the strip, when is electrically connected to the mobile computer, the connection assembly is mechanically connected to the mobile computer, and the game controller can be bent into a desired angle relative to the mobile computer along the strip.

13. The mobile computer as claimed in claim 12, wherein when the plug is inserted in the mounting slot and is aligned with the ventilating slot, the air flow from the fan enters inside the mobile computer via the plug and the ventilating slot to expel warm air from inside the mobile computer and draw cooler air into the mobile computer; when the main body rotates along the strip to a desired angle relative to the mobile computer, the plug is electrically connected between the game controller and the mobile computer, and the game controller is implemented as bracket to support and secure the mobile computer in a manner convenient for viewing the mobile computer.

14. The mobile computer as claimed in claim 10, further comprising a control system, wherein the control system comprises a microcontroller, a motor driver and a motor electrically connected to the fan, the motor drive is electrically connected between the microcontroller and the motor, the motor drive transmits power to the motor to control and adjust the rotational speed of the motor under the control of the microcontroller, the motor imparts motion or power to the fan to control and adjust the rotational speed of the fan, and the dust in the ventilating slot and the mobile computer is conducted and expelled out.

15. The mobile computer as claimed in claim 14, wherein the control system further comprises a first sensor and a second sensor electrically connected the microcontroller, the first sensor is positioned in the handle and uses piezoelectric effect to measure the strain upon the handle due to applied pressure, the first sensor sends a control signal to the microcontroller due to applied pressure on the handle, the microcontroller controls the motor to activate the fan to output air flow to the mobile computer, the second sensor is positioned in the mobile computer, and measures current temperature inside the mobile computer, and the microcontroller controls...
and adjusts the rotational speed of the fan according to the current temperate inside the mobile computer.

16. A mobile computer, comprising:
   a housing defining a mounting slot defined at one side thereof;
   an electrical connector port located within the mounting slot;
   a game controller detachably connected to the housing, and
   comprising:
   a main body;
   a connection assembly connected between the main body and the housing, the connection assembly comprising:
   a strip flexibly connected to the main body; and
   a connector located within the plug, wherein the plug is detachably inserted to the mounting slot, the connector is electrically connected to the electrical connector of the mobile computer, and the game controller communicates with the mobile computer through the connector and the electrical connector, the main body is rotatably connected to the housing through the connection assembly, when the main body is bent to a predetermined angle relative to the housing, the game controller is used as a bracket to support and secure the mobile computer.

17. The mobile computer as claimed in claim 16, wherein the mounting slot defines a ventilating hole adjacent to the electrical connector, the electrical connector is electrically connected to internal circuits of the mobile computer, and the housing further defines a plurality of air outlets at the side of the housing far away from a corresponding mounting slot, and the main body comprises a handle and a fan, the main body defines a ventilating slot far away from the keys, and the fan is received within the ventilating slot.

18. The mobile computer as claimed in claim 17, wherein the main body further comprises a plurality of air inlets on the surface of the main body, the plurality of air inlets communicate with the ventilating slot to provide air entrance for the fan, when the plug inserts into the mounting slot and is aligned with the ventilating slot, the air flow from the fan enters inside the mobile computer via the plug and the ventilating slot to expel warm air from inside the mobile computer and draw cooler air into the mobile computer.

19. The mobile computer as claimed in claim 17, further comprising a control system, wherein the control system comprises a microcontroller, a motor driver and a motor electrically connected to the fan, the motor driver is electrically connected between the microcontroller and the motor, the motor driver transmits power to the motor to control and adjust the rotational speed of the motor under the control of the microcontroller, the motor imparts motion or power to the fan to control and adjust the rotational speed of the fan, and the dust in the ventilating slot and the mobile computer is conducted and expelled out.

20. The mobile computer as claimed in claim 19, wherein the control system further comprises a first sensor and a second sensor electrically connected to the microcontroller, the first sensor is positioned in the handle and uses piezoelectric effect to measure the strain upon the handle due to applied pressure, the first sensor sends a control signal to the microcontroller due to applied pressure on the handle, the microcontroller controls the motor to activate the fan to output air flow to the mobile computer, the second sensor is positioned in the mobile computer, and measures current temperate inside the mobile computer, and the microcontroller controls and adjusts the rotational speed of the fan according to the current temperate inside the mobile computer.