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(54) **GAME CONTROLLER WITH MINI CONTROL-WHEEL**

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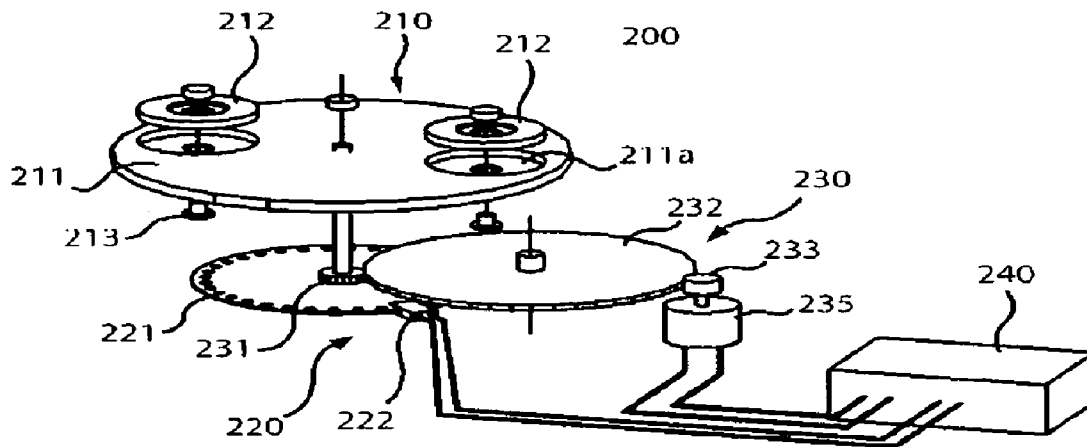
(57) **ABSTRACT**

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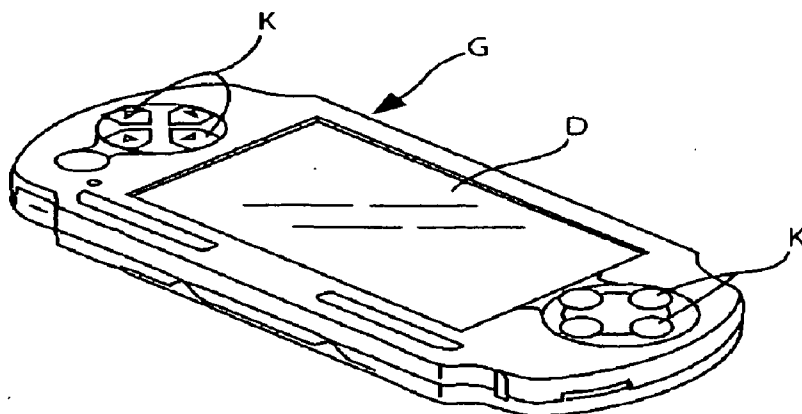
A portable or hand-held game controller comprises: a wheel rotation unit which is rotatable; a rotation detection unit for detecting a rotation angle and a rotation direction of the wheel rotation unit; and a circuit block for receiving data from the rotation detection unit and applying the data to a game.

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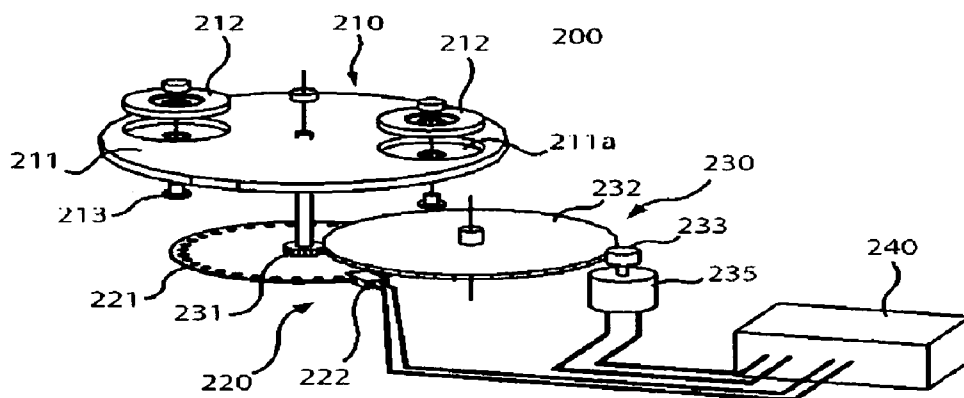
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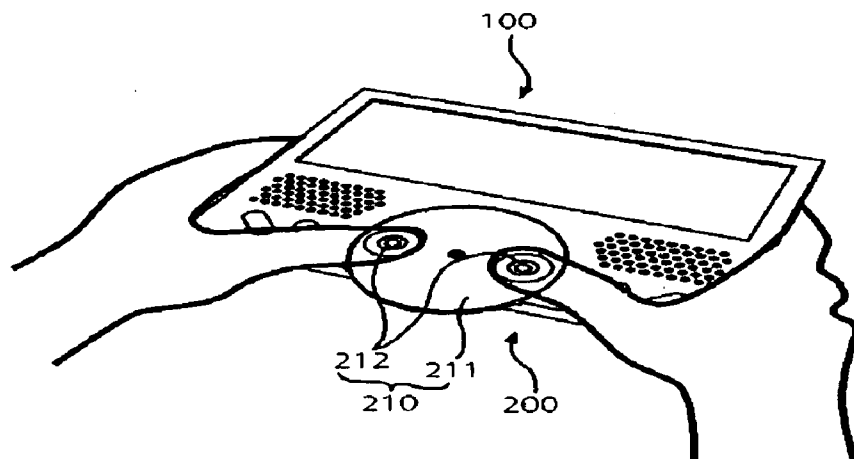
[Fig. 1]



[Fig. 2]



[Fig. 3]



GAME CONTROLLER WITH MINI CONTROL-WHEEL

TECHNICAL FIELD

[0001] The present invention is directed to providing a game controller on which a mini control wheel, rotated by a user's fingers, is mounted so that the user can enjoy a racing game rich in reality.

BACKGROUND ART

[0002] Recently, many people are enjoying computer games on a personal computer, a portable game controller and a console game controller.

[0003] FIG. 1 is a perspective view illustrating a conventional portable game controller.

[0004] As shown in FIG. 1, the conventional portable game controller G has a display panel D in the middle and control buttons K on the right side and the left side. Games are controlled and played by using the control buttons K.

[0005] A portable game controller or a home computer game controller uses various buttons or joysticks to control games.

[0006] Meanwhile, a racing game is a game of driving a car or a motorcycle, and the conventional portable game controller and home computer game controller use buttons or joysticks to control the movement of the car or the motorcycle.

[0007] However, since the conventional game controllers use buttons or joysticks to play a racing game, it is difficult for game players to feel like they are actually driving a car or a motorcycle by turning a steering wheel.

DISCLOSURE OF INVENTION

Technical Problem

[0008] The present invention is directed to providing a game controller on which a mini control wheel, rotated by a user's fingers, is mounted so that the user can enjoy a racing game rich in reality.

Technical Solution

[0009] The game controller with a mini control wheel of the present invention provides: a wheel rotation unit which is rotatable; a rotation detection unit for detecting a rotation angle and a rotation direction of the wheel rotation unit; and a circuit block for receiving data from the rotation detection unit and applying the data to a game.

Advantageous Effects

[0010] The user can enjoy the racing game rich in reality.

[0011] The rotatable disks of the present invention are not merely used as driving means in the racing game.

[0012] They can also perform the function of moving a cursor like buttons and joysticks when watching other games or reading material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The above and other aspects, features and other advantages of the subject matter of the present disclosure will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0014] FIG. 1 is a perspective view illustrating a conventional portable game controller;

[0015] FIG. 2 is a perspective view illustrating a structure of a mini control wheel according to an embodiment of the present invention; and

[0016] FIG. 3 is a view illustrating a state of using a game controller on which a mini control wheel is mounted according to an embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0017] In an embodiment of the present invention, a portable or hand-held game controller comprises: a wheel rotation unit which is rotatable; a rotation detection unit for detecting a rotation angle and a rotation direction of the wheel rotation unit; and a circuit block for receiving data from the rotation detection unit and applying the data to a game.

[0018] The game controller further comprises a rotation load unit which is controlled by the circuit block to control a rotation load of the wheel rotation unit.

[0019] The wheel rotation unit includes a wheel plate which is disposed or mounted on the main body of the game controller to be rotatable; and at least more than one rotatable disk which are disposed on the upper part of the wheel plate.

[0020] The rotation detection unit includes: a detection plate which is connected to the wheel rotation unit in the same axis and has a plurality of holes formed on its circumference around the same axis; and a sensor which transmits a signal that detects a rotation angle and a rotation direction of the detection plate to the circuit block.

[0021] The sensor includes a light emitting unit and a light receiving unit and has a structure that the plurality of holes formed on the detection plate pass between the light emitting unit and the light receiving unit.

[0022] The rotation load unit includes: a gear unit which is combined to the center axis of the wheel rotation unit; and a motor which is combined to the gear unit, wherein the motor receives a control signal from the circuit block to inflict a rotation load on the wheel rotation unit through the gear unit.

[0023] The circuit block includes a rotation signal transmission unit and a load control unit; the rotation signal transmission unit receives a signal detected by the sensor, changes the signal into digital data and transmits the data to an input unit of the game controller; and the load control unit receives a data signal showing a game progress, namely, a speed or rotation of a moving object which races to generate a corresponding control signal and transmits the signal to the rotation load unit.

MODE FOR THE INVENTION

[0024] As illustrated in FIGS. 2 and 3, a game controller having a control wheel includes a main body 100 and a control wheel 200 which is mounted on the main body 100 or an upper part of the main body 100 and rotated by the control of a user.

[0025] The control wheel 200, as illustrated in FIG. 3, is mounted on the main body 100 so that it can be rotated by using a user's fingers.

[0026] Although the control wheel can be controlled by using any part of a human body, it will be most convenient to use thumbs to control the control wheel and use the remaining fingers to take hold of the game controller as illustrated in FIG. 3.

[0027] The control wheel **200** includes a wheel rotation unit **210**, a rotation detection unit **220**, a rotation load unit **230** and a circuit block **240**.

[0028] The wheel rotation unit **210**, which is in contact with the user's fingers, is mounted on the main body **100** or the upper part of the main body **100** of the game controller so that it can rotate.

[0029] The rotation detection unit **220** detects a rotation angle and a rotation direction of the wheel rotation unit **210**.

[0030] The rotation load unit **230** controls a rotation load on the wheel rotation unit **210** according to circumstances of a game so that the user can feel like the user is driving in an actual race.

[0031] The circuit block **240** receives data from the rotation detection unit **220** to apply the data to the game and controls the rotation load, which is provided from a racing program, in the rotation load unit **230**.

[0032] In detail, the wheel rotation unit **210** includes a wheel plate **211** which is disposed or mounted on the upper part of the main body **100** of the game controller to be rotatable and rotatable disks **212** which are disposed on the right side and the left side of the upper part of the wheel plate **211**. For the wheel rotation unit **210**, a plate structure which can rotate around a center axis, such as a disk, can be mainly used.

[0033] At the upper part of the wheel plate **211**, receptive grooves **211a** are formed to place each of the rotatable disks **212**.

[0034] Each of the rotatable disks **212** is combined to the wheel plate **211** with screws **213**. As shown in FIG. 3, the user puts thumbs on the wheel rotation unit **210**, especially on the rotatable disks **212**, and gives a turning force to them so that the wheel plate **211** can rotate around the center axis of the wheel plate **211**.

[0035] The rotatable disks **212** can be combined to the wheel plate **211** to be rotatable. In this case, the rotatable disks **212** rotate separately when the wheel plate **211** rotates so that it is possible to prevent thumbs on the rotatable disks from being pushed through a contact with the wheel plate **211**. Thus, the user can rotate the wheel plate more easily and conveniently.

[0036] The rotation detection unit **220** includes a detection plate **221** which is connected to the wheel rotation unit **210**, more precisely, to the wheel plate **211** in the same axis and has a plurality of holes formed on its circumference around the same axis and a sensor **222** which detects a rotation angle and/or a rotation direction of the detection plate **221** and transmits data to the circuit block **240**.

[0037] It is desirable for the sensor to have a structure capable of detecting the rotation angle and rotation direction of the detection plate **221** by detecting positions of the holes formed on the detection plate **221** and a change of speed when the detection plate **221** is rotated.

[0038] For example, as illustrated in FIG. 2, the sensor **222** includes a light emitting unit and a light receiving unit and has a structure that the plurality of holes formed on the detection plate **221** pass between the light emitting unit and the light receiving unit. That is, the light emitting unit and the light receiving unit cover an edge of the detection plate **221** having the plurality of holes. In general, the light emitting unit includes a light emitting diode (LED) and the light receiving unit includes a light sensor for sensing light emitted from the LED.

[0039] The sensor **222** detects the rotation angle and rotation direction of the detection plate **221** and the wheel rotation unit **210** by sensing the movement of the holes formed on the detection plate **221**.

[0040] The rotation load unit **230** includes a gear unit which is engaged to the center axis of the wheel rotation unit **210** and a motor **235** which is combined to the gear unit.

[0041] It is desirable for the gear unit to have a plurality of gears which are combined to the center axis of the wheel rotation unit **210**, more precisely, the wheel plate **211**. For example, as illustrated in FIG. 2, the gear unit can include a first gear **231**, a second gear **232** which is engaged to the first gear **231** and a third gear **233** which is engaged to the second gear **232** and the motor **235**.

[0042] At this time, the diameter of the second gear **232** is made bigger than that of the first gear **231** to reduce a rotation speed of the wheel rotation unit **210**.

[0043] The circuit block **240** includes a rotation signal transmission unit and a load control unit.

[0044] The rotation signal transmission unit of the circuit block **240** receives a rotation signal detected by the sensor **222**, changes the signal into digital data and transmits the data to an input unit of the game controller. The game controller reflects the received data in a direction change or a rotation of a moving object which races.

[0045] The load control unit of the circuit block **240** receives a data signal indicative of a game progress, namely, a speed or rotation of the moving object which races in order to generate a motor control signal and transmits the signal so that the motor **235** is loaded or unloaded, rotated or reversely rotated. Accordingly, the motor **235** controls the load on the gear unit and the wheel rotation unit **210** in order that the user can feel like he is actually steering a wheel in various driving situations. That is, the user can rotate the rotatable disks lightly when the motor is unloaded, and the user can actually feel a rotation load in rotating the rotatable disks when the rotatable disks are loaded during a racing (a rotation in the low speed or a rapid rotation) because an electrical signal is given to the motor to increase the rotation load.

[0046] The operational state and process of the present invention are as follows.

[0047] When the user plays a racing game, he puts thumbs on the rotatable disks **212** and rotates the wheel plate **211** to the left or to the right according to game circumstances.

[0048] When the wheel plate **211** rotates, the detection plate **221** also rotates. At this time, the sensor **222** detects the rotation angle and rotation direction of the detection plate **221**.

[0049] The derived data are transmitted to the circuit block **240** and transmitted again to the input unit of the game controller so that the moving object which races in the game moves.

[0050] Meanwhile, in case that the rotatable disks are to be loaded considering the speed or rotation of the moving object which races in the game, the circuit block **240** rotates or reversely rotates the motor **235** and the rotating power of the motor **235** is transferred to the wheel plate **211** by way of the gear unit. Thus, the user can control the strength and weakness of the load when rotating the wheel rotation unit **210**.

[0051] Therefore, the user can enjoy the racing game rich in reality.

[0052] The rotatable disks of the present invention are not merely used as driving means in the racing game. They can

also perform the function of moving a cursor like buttons and joysticks when watching other games or reading material.

INDUSTRIAL APPLICABILITY

[0053] The game controller on which a mini control wheel, rotated by a user's fingers, is mounted so that the user can enjoy a racing game rich in reality.

1. A portable or hand-held game controller, comprising:
 - a wheel rotation unit which is rotatable;
 - a rotation detection unit for detecting a rotation angle and a rotation direction of the wheel rotation unit; and
 - a circuit block for receiving data from the rotation detection unit and applying the data to a game.
2. The game controller of claim 1, further comprising a rotation load unit which is controlled by the circuit block to control a rotation load of the wheel rotation unit.
3. The game controller of claim 1, wherein the wheel rotation unit includes:
 - a wheel plate which is disposed or mounted on the main body of the game controller to be rotatable; and
 - at least more than one rotatable disk which are disposed on the upper part of the wheel plate.
4. The game controller of claim 1, wherein the rotation detection unit includes:
 - a detection plate which is connected to the wheel rotation unit in the same axis and has a plurality of holes formed on its circumference around the same axis; and

a sensor which transmits a signal that detects a rotation angle and a rotation direction of the detection plate to the circuit block.

5. The game controller of claim 4, wherein the sensor includes a light emitting unit and a light receiving unit and has a structure that the plurality of holes formed on the detection plate pass between the light emitting unit and the light receiving unit.

6. The game controller of claim 2, wherein the rotation load unit includes:

- a gear unit which is combined to the center axis of the wheel rotation unit; and
- a motor which is combined to the gear unit, wherein the motor receives a control signal from the circuit block to inflict a rotation load on the wheel rotation unit through the gear unit.

7. The game controller of claim 2, wherein the circuit block includes a rotation signal transmission unit and a load control unit; the rotation signal transmission unit receives a signal detected by the sensor, changes the signal into digital data and transmits the data to an input unit of the game controller; and the load control unit receives a data signal showing a game progress, namely, a speed or rotation of a moving object which races to generate a corresponding control signal and transmits the signal to the rotation load unit.

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