ENCOURAGING EXERCISE WHILST PLAYING ELECTRONIC GAMES

Abstract: In order to encourage people who are playing an electronic games machine (12) also to take exercise, and to encourage users of exercise machines (76) who simultaneously play a games machine to exercise at a particular rate, an interrupter system (34) is added to an existing connection (18,20,22) between the games machine and its controller (14) so as to provide a modified connection. Operation of the exercise machine is detected, and the interrupter system is used selectively to enable and interrupt the modified connection between the game controller and the games machine to enable and interrupt normal operation of the games machine in dependence upon the detected operation of the exercise machine. The normal operation of the games machine may be interrupted if the rate of operation of the exercise machine is detected as being below a predetermined threshold and/or above a predetermined threshold. Accordingly, a parent can arrange it such that their child cannot play normally on a games machine unless the child also exercises on the exercise machine. Also, a user of an exercise machine and games machine can be encouraged to exercise in a particular manner, otherwise the game will be interrupted.
Encouraging exercise whilst playing electronic games

This invention was conceived in order to encourage exercise whilst playing electronic games and relates to a method of operation of an electronic games machine, a device for use with an electronic games machine, and a game controller having such a device.

Many people have fun playing on electronic games machines, such as the Microsoft® X-Box®, Nintendo® Gamecube® and the Sony® Playstation®. Some people, particularly parents, consider that other people, such as their children, spend far too long playing on games machines and do not get enough exercise.

Also, many people use exercise machines, such as exercise cycles, step machines and thigh trainers in order to improve or maintain their physical fitness. Many exercise regimes involve exercising at a steady rate. While using exercise machines, some people simultaneously play a game on an electronic games machine.

Causing the playing of a game to be dependent on exercise has been proposed in the past. Patent documents US4542897 and US4637605 each describe a purpose-built games and exercise machine arranged so that the user cannot control the game unless they are exercising at a particular rate. WO00/64542A1 describes an exercise machine connected to a game port of a computer running a game such that the exercise machine acts as a throttle control for the game. US6179746B1 describes a switch box controlled by an exercise machine and connected to an RF input of a television set so that the television set can receive RF input only if the exercise machine is being operated fast enough. The RF signal can be supplied by a games machine.

An aim of the present invention, or at least of specific embodiments of it, is to provide an improved way of encouraging people who are playing a games machine also to take exercise, and of encouraging users of exercise machines who simultaneously play a games machine to exercise at a particular rate.

In accordance with a first aspect of the present invention, there is provided a method of modifying operation of an electronic games machine having a game controller which is arranged to be connected to the games machine by an existing connection to control the games machine,
the method comprising: adding an interrupter system to the existing connection so as to provide a modified connection between the game controller and the games machine; providing an exercise machine; detecting operation of the exercise machine; and using the interrupter system selectively to enable and interrupt the modified connection between the game controller and the games machine to enable and interrupt normal operation of the games machine in dependence upon the detected operation of the exercise machine.

The method can therefore be applied be an existing games machine and existing exercise machine without requiring a purpose-built combined machine as described in US4542897 and US4637605. The interrupter system used in the method of the invention is operable to interrupt the normal operation of the games machine, whereas in WO00/64542A1 the exercise machine plays a part in the normal operation of the games computer (i.e. acts as the throttle control), and in US6179746B1 the exercise machine has no effect on the normal operation of the games machine.

The normal operation of the games machine may be interrupted if the rate of operation of the exercise machine is detected as being below a predetermined threshold. Additionally or alternatively, normal operation of the games machine may be interrupted if the rate of operation of the exercise machine is detected as being above a predetermined threshold. Accordingly, a parent can arrange it such that their child cannot play normally on a games machine unless the child also exercises on the exercise machine. Also, a user of an exercise machine and games machine can be encouraged to exercise in a particular manner, otherwise their game will be interrupted. The invention can be put into effect without modifying the games machine and possibly invalidating its warranty as a result.

The predetermined threshold, or at least one of the predetermined thresholds, is preferably adjustable to take account of different exercise regimes.

The normal operation of the games machine is preferably interrupted simply by disconnecting a power supply connection from the games machine to the game controller.

In one example of the invention, in the case where the existing connection includes a first connector of the game controller that is releasably connectable to a complementary second connector of the games machine, the interrupter system is added by connecting a third connector of the interrupter system to the first connector of the game controller and by connecting a fourth connector of the interrupter system to the second connector of the games machine. In another
example of the invention, the interrupter system is added by permanently wiring the interrupter system to the game controller.

In a preferred embodiment, at least one magnet is attached (for example by a double-sided sticky pad) to a moving part of the exercise machine, and operation of the exercise machine is detected magnetically. The invention can therefore be put into effect without any significant modification to the exercise machine.

In accordance with a second aspect of the invention, there is provided a game controller in combination with an interrupter system, for use with an electronic games machine and an exercise machine, the game controller having a first connector for releasable connection to a complementary second connector of the games machine, and the interrupter system comprising means for detecting operation of the exercise machine, and means for changing, in dependence upon the detected operation of the exercise machine, an electrical connection between the game controller and the games machine selectively to enable and interrupt normal operation of the games machine.

In one embodiment, the interrupter system includes a third connector connected to the first connector of the game controller and a fourth connector for connection to the second connector of the games machine so that the interrupter system is connected between the first and second connectors. In this case, the invention can be put into effect without modifying the games machine or the game controller and possibly invalidating their warranties as a result. In another embodiment, the interrupter system is permanently wired to the game controller.

Further aspects of the invention relate to the game controller and interrupter system in combination with a games machine and/or an exercise machine.

A specific embodiment of the present invention will now be described, purely by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a conventional games machine system;

Figure 2 is a block diagram of the system of Figure 1, to which a game interrupter system of the present invention has been added;

Figure 3 is a circuit diagram of the game interrupter system of Figure 2;

Figures 4A-4D are diagrams illustrating operation of the circuit of Figure 3 in one phase of its cycle;
Figures 5A-5D are diagrams illustrating operation of the circuit of Figure 3 in another phase of its cycle;

Figures 6A-6D are diagrams illustrating operation of the circuit of Figure 3 with a relatively long cycle period;

Figures 7A-7D are diagrams illustrating operation of the circuit of Figure 3 with a shorter cycle period;

Figure 8 shows a modification to part of the interrupter system;

Figure 9 shows another modification to part of the interrupter system; and

Figure 10 shows a modification to the interrupter circuit.

Referring to Figure 1, a conventional games machine system 10 comprises a games machine 12, a game controller 14 and a television set 16. The game controller 14 has a connecting lead 18 with a plug 20 at its distal end that is connected to a complementary controller socket 22 of the games machine 12. A further connecting lead 24 has plugs 26 at one end that are connected to complementary audio-video sockets 28 of the games machine 12 and plugs 30 at the other end that are connected to complementary audio-video sockets 32 of the television set 16. As is well known, in use, a player controls a game that is running on the games machine 12 using the controller 14, and the progress of the game is displayed on the television set 16. Typically, a games machine 12 has two or more such controller sockets 22 and can be used with two or more game controllers 14 controlled by two or more players so that the players can play a game between themselves. However, many games are designed to be played by one player, or have a mode in which they can be played by one player, or have a mode in which one player controlling one games machine 12 can play one or more other players controlling one or more other games machines 12, with all of the games machines 12 being interconnected, for example by means of the internet.

The connecting lead 18 of the game controller 14 typically has six cores, one of which is ground, another of which carries a supply voltage to the games controller 14, and the others of which provide signals back to the games machine 12 depending upon the operation of the controls (such as switches, joysticks and D-pads) of the game controller 14 by the player. A typical games machine 12 is designed to detect whether a required game controller 14 is connected to the games machine 12, for example by detecting current drawn by the supply core of the controller lead 18, or by detecting the voltage or voltages on one or more of the signal
cores of the controller lead 18. When a game is running, different games machines and games are designed to react differently to the loss of connection to a required game controller 14, for example, by continuing the game abnormally without any input from the player, by pausing the game until the game controller is reconnected, or by aborting the game. Some games machine systems allow a game controller to be disconnected for a short period of time, such as ¼s, without reacting.

Referring to Figures 2 and 3, in the first embodiment of the invention, an interrupter system 34 is added between the controller socket 22 of the games machine 12 and the plug 20 of the controller connection lead 18. The interrupter system 34 includes an extension lead 36 having a plug 38 at one end that is complementary to the controller socket 22 of the games machine 12 and a socket 40 at the other end that is complementary to the plug 20 of the controller lead 18. The extension lead 36 provides permanent one-to-one connections between each of the terminals 42, except the supply voltage terminal 44, of the plug 38 and the respective terminals 46, except the supply voltage terminal 48, of the socket 40. An interrupter lead 50 also extends from the extension plug 38 to an interrupter housing 52 and contains two cores 54,56 that are connected to the supply voltage terminals 44,48 of the extension plug 38 and socket 40, respectively.

In the interrupter housing 52, the cores 54,56 of the interrupter lead 50 are connected across the switch contacts of a normally-open switch 58 of a reed relay 60. One terminal of the coil 62 of the reed relay 60 is connected in series with a resistor 64 and a capacitor 66 to a common contact of a two-pole, magnetically-operable reed switch 68. The other terminal of the relay coil 62 is connected directly to the normally-closed contact of the reed switch 68 and is also connected via a battery 70 to the normally-open contact of the reed switch 68.

The interrupter system 34 also includes one or more magnets 72 that, in use, are attached for example by double-sided sticky-pads to a moving part 74 of an exercise machine 76, such as a bottom bracket spindle of an exercise cycle on which the pedal cranks are mounted, or a pedal spindle of a stepper machine. The interrupter housing 52 is mounted on a static part of the exercise machine 76, for example by hook-and-loop fastening tape or double-sided sticky-pads, with the reed switch 68 within the influence of the magnet or magnets 72 such that, during steady operation of the exercise machine 76, the reed switch 68 opens and closes with the open time being about equal to the closed time.
The values of the coil resistance, pickup voltage $V_p$ and dropout voltage $V_d$ of the relay 60, the resistance of resistor 64, the capacitance of the capacitor 66, and the voltage of the battery 70 are chosen so that the interrupter system 34 operates as follows.

As shown in Figures 4A to 4D, if the state $S_2$ of the reed switch 68 is initially in its normally-closed (NC) position and the capacitor 66 is initially discharged ($V_c=0$), the voltage $V_r$ across the relay coil 62 is zero and so the state $S_r$ of the relay switch 58 is open. When the state $S_2$ of the reed switch 68 then changes to normally-open (NO) due to the influence of one of the magnets 72, the voltage $V_r$ across the relay coil 62 initially rises to a value above the pickup voltage $V_p$ of the relay 60, and so the state $S_r$ of the relay switch 58 immediately changes to closed. As the capacitor 66 charges, the voltage $V_c$ across it increases, and the voltage $V_r$ across the relay coil 62 decays. When the voltage $V_r$ across the relay coil 62 falls to the dropout voltage $V_d$ of the relay 60, the state $S_r$ of the relay switch 58 changes to open.

As shown in Figures 5A to 5D, if the state $S_2$ of the reed switch 68 is initially NO and the capacitor 66 is initially fully charged, the voltage $V_r$ across the relay coil 62 is zero and so the state $S_r$ of the relay switch 58 is open. When the state $S_2$ of the reed switch 68 then changes to NC due to the influence of the magnet 72 being removed, the voltage $V_r$ across the relay coil 62 initially rises to a value below the negative pickup voltage $-V_p$ of the relay 60, and so the state $S_r$ of the relay switch 58 immediately changes to closed. As the capacitor 66 discharges, the voltage $V_c$ across it decays, and the voltage $V_r$ across the relay coil 62 increases towards zero. When the voltage $V_r$ across the relay coil 62 increases to the negative dropout voltage $-V_d$ of the relay 60, the state $S_r$ of the relay switch 58 changes to open.

As shown in Figures 6A to 6D, if the effects described above with reference to Figures 4A to 5D are combined in a repeating sequence with a relatively long cycle period $T=T_1$, relay switch 58 closes and opens twice in each period $T_1$. However, as shown in Figures 7A to 7D, for a shorter cycle period $T=T_2$, once the relay switch 58 closes, it remains closed because the voltage $V_r$ across the relay coil 62 does not fall below the positive dropout voltage $V_d$ before the reed switch 68 opens and does not rise above the negative dropout voltage $-V_d$ before the reed switch 68 closes.

The period $T$ of the cycle of operation of the reed switch 68 is inversely proportional to the rate of operation of exercise machine 76. The game being played on the games machine 12 will only operate normally if the relay switch 68 remains closed. Therefore, it is necessary for the user to operate the exercise machine at a rate in excess of a predetermined rate in order that the game can be played continuously without interruption.
It should be noted that the above is a simplified description of the operation of the interrupter system 34. It does not, for example, take into account the transition times of the reed switch 68 and relay switch 58 or the inductance of the relay coil 62 which will have an effect when the voltage \( V_r \) across the relay coil 62 suddenly changes from above \( V_d \) to below \(-V_d\).

The values of the circuit components can be chosen to provide a required cycle period \( T \). In a prototype the chosen circuit values were: battery voltage = 9V; resistance of resistor 64 = 470\( \Omega \); capacitance of capacitor 66 = 1000\( \mu \)F; resistance of relay coil 62 = 500\( \Omega \); pickup voltage \( V_p \) of relay 60 = 1.6V; dropout voltage \( V_d \) of relay 60 = 1.5V; nominal switching time of relay 60 = 0.5ms; and nominal switching time of reed switch 68 = 0.2ms. This required the cycle period \( T \) to be less than about 3s in order to maintain the relay switch 58 closed.

It will be appreciated that many modifications and developments may be made to the embodiment of the invention described above.

For example, as shown in Figure 8, rather than providing the interrupter system 34 with an extension lead 36, the plug 38 and socket 40 may be combined into a single housing 78.

In either case, where the use of the interrupter system 34 is being enforced, for example by a parent upon their child, the plug 38 may be permanently or semi-permanently connected to the socket 22 of the games machine 12, or the socket 40 may be permanently or semi-permanently connected to the plug 20 of the controller lead 18, for example by adhesive, by adhesive, tamper-evident, security tape, by some other tamper-evident device, or by a lockable mechanism.

Alternatively, as shown in Figure 9, the lead 50 of the interrupter system 34 may be permanently wired into the game controller 14 and indeed part of the other circuitry of the interrupter system 34 may be disposed inside the game controller 14. In this case, the games controller 14 and interrupter system 34 may be supplied and sold ready-wired, or the interrupter system 34 may be supplied and sold with instructions for permanently connecting it to an existing game controller 14.

As shown in Figure 10, the threshold rate at which the interrupter system 34 permits normal operation of the games machine 12 may be made adjustable, for example by placing a variable resistor 80 of maximum value 1k\( \Omega \) in series with the resistor 64. Also, an override and/or disable facility may be provided by a key-operated switch 82 that in one position does not affect the operation of the interrupter system 34, but that in another position directly
connects the cores 54,56 of the lead 50 so that the interrupter system 34 has no effect and/or in another position disconnects the relay switch 58 so that the games machine 12 cannot be operated normally.

Many other modifications may be made to the interrupter system 34. For example, it may also provide the facility to interrupt normal operation of the games machine 12 if the exercise machine 76 is operated too fast. Indeed, with suitable selection of components, the circuit described with reference to Figure 3 may provide that effect. Also, a resistor may be placed in series with the battery 70 so that the time constant for charging the capacitor 66 is longer than the time constant for discharging it.

It should be noted that the embodiment of the invention has been described above purely by way of example and that many other modifications and developments may be made thereto within the scope of the present invention.
CLMNS

1. A method of modifying operation of an electronic games machine (12) having a game controller (14) which is arranged to be connected to the games machine by an existing connection (18,20,22) to control the games machine, the method comprising:
adding an interrupter system (34) to the existing connection so as to provide a modified connection (18,20,22,36,38,40) between the game controller and the games machine;
providing an exercise machine (76);
detecting operation of the exercise machine; and
using the interrupter system selectively to enable and interrupt the modified connection between the game controller and the games machine to enable and interrupt normal operation of the games machine in dependence upon the detected operation of the exercise machine.

2. A method as claimed in claim 1, wherein the normal operation of the games machine is interrupted if the rate of operation of the exercise machine is detected as being below a predetermined threshold.

3. A method as claimed in claim 1 or 2, wherein the normal operation of the games machine is interrupted if the rate of operation of the exercise machine is detected as being above a predetermined threshold.

4. A method as claimed in any preceding claim, wherein the predetermined threshold, or at least one of the predetermined thresholds, is adjustable.

5. A method as claimed in any preceding claim, wherein normal operation of the games machine is interrupted by disconnecting a power supply connection (44,48) from the games machine to the game controller.

6. A method as claimed in any preceding claim, wherein the existing connection includes a first connector (20) of the game controller that is releasably connectable to a complementary second connector (22) of the games machine, and the interrupter system is added by connecting a third connector (40) of the interrupter system to the first connector of the game controller and by connecting a fourth connector (38) of the interrupter system to the second connector of the games machine.

7. A method as claimed in any of claims 1 to 5, wherein the interrupter system is added by permanently wiring the interrupter system to the game controller.
8. A method as claimed in any preceding claim, wherein at least one magnet (72) is attached to a moving part of the exercise machine, and operation of the exercise machine is detected magnetically.

9. A game controller (14) in combination with an interrupter system (34), for use with an electronic games machine (12) and an exercise machine (76), the game controller having a first connector (20) for releasable connection to a complementary second connector (22) of the games machine, and the interrupter system comprising means (64-70) for detecting operation of the exercise machine, and means (60) for changing, in dependence upon the detected operation of the exercise machine, a connection (44,48,54,56) between the game controller and the games machine selectively to enable and interrupt normal operation of the games machine.

10. A combination as claimed in claim 9, wherein the interrupter system includes a third connector (40) connected to the first connector of the game controller and a fourth connector (38) for connection to the second connector of the games machine so that the interrupter system is connected between the first and second connectors.

11. A combination claimed in claim 9, wherein the interrupter system is permanently wired to the game controller.

12. A combination as claimed in any of claims 9 to 11 in combination with a games machine.

13. A combination as claimed in any of claims 9 to 12 in combination with an exercise machine.
INTERNATIONAL SEARCH REPORT

PCT/GB2006/002333

A CLASSIFICATION OF SUBJECT MATTER

INTERNATIONAL FAMILY OF PATENTS

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

A63F 13/00 A63B 22/06

INV.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A63F A63B

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category* Citation of document with indication, where appropriate, of the relevant passages Relevant to claim No

Y US 4 637 605 A (RITCHIE ET AL)
20 January 1987 (1987-01-20)
cited in the application
abstract
column 1, line 56 - line 68
column 3, line 1 - line 6
column 4, line 56 - column 5, line 22;
figure 1

Y US 6 179 746 A1 (DEIMAN DAVID HARRIS)
30 January 2001 (2001-01-30)
cited in the application
column 5, line 8 - column 6, line 3
column 3, line 5 - line 45; claim 1;
figures

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

E: earlier document but published on or after the international filing date

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Date of the actual completion of the international search

22 September 2006

Date of mailing of the international search report

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