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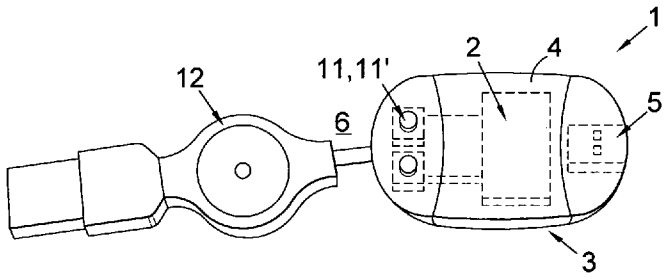

(57) **Abstract:** The invention relates to apparatus (1) for controlling a computer game, comprising motion sensor means (2) adapted to detect movement for control of a game being played by a user or player. The motion sensor means (2) is an integral part of a USB Flash Drive (3), and can comprise an accelerometer, gyroscope, magnetic sensor and the like means. In the preferred embodiments an accelerometer is the sensor (2), and is used to detect motion either in 2D (x- and y- axes) or 3D (x-, y-, and z- axes). In either mode, the sensor (2) measures/monitors one or more of different parameters of the USB Flash Drive (3), for example tilt angle, angular velocity, acceleration of the USB Flash Drive. The sensor (2) is added to or installed in a USB Flash Drive in a housing (4), which has two USB ports (5, 6). The housing (4) houses an integrated circuit (7), a memory (8), an MCU (9), which is a microcomputer or computer-on-a-chip. The MCU (9) is connected to the sensor (2) and to a variable or adjustable parameter input device (10) for adjusting the level of sensitivity of the sensor (2) via the MCU (9). The device (10) in the embodiment is in the form of manually operable i.e. finger or thumb operable, means such as a button. Ih the embodiment there are two buttons (11, 11 ') side by side at one end of the housing (4). The MCU (9) is connected to one USB port and the integrated circuit (IC) to a second USB port (5), both ports being of the USB Flash Drive. As shown in Fig. 1, the two-port arrangement is used in conjunction with an extendable USB cable (12) plugged into one USB port (6) on the game controller side of the USB Flash Drive.

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GAME CONTROLLERS

The invention relates to a game controller, particularly to a game controller for playing a computer game which can be hand-held, a personal computer or part of a computer network where a plurality of players can play the game whilst located at spaced-apart locations.

Whilst there are many known game controllers, none takes account of movement of the game controller, which can result in loss of sensitivity when playing a game.

It is an object of the invention to seek to mitigate these disadvantages.

According to a first aspect, the invention provides apparatus for controlling a computer game, comprising motion sensor means adapted to detect movement for control of the game.

The motion sensor means may be selected from a group comprising at least an accelerometer, gyroscope, magnetic sensor and visual sensor. This provides for relative simplicity and operation of a game, particularly when the motion sensor means may be installed in a USB Flash Drive. This allows a user/player of a game to use a USB Flash Drive to control the game based on motion.

The USB Flash Drive may comprise a USB extendable cable.

Alternatively, the US|B Flash Drive may comprise one USB port, whereby the apparatus and USB Flash Drive are merged.

The apparatus may comprise a USB switch, or alternatively a USB Hub.

Suitably, the motion sensor means may comprise an accelerometer means, which may be adapted to measure acceleration along the x – and y – axes, or alternatively may be adapted to measure acceleration along the x-, y- and z- axes.

There may be means adapted to adjust sensitivity of the motion sensor means.

The said means may comprise a variable or adjustable parameter input device for adjusting the level of sensitivity of the motion sensor means.

The device may be selected from the group variable resistor(s), variable capacitor(s) and adjustable input switch(es). Sensitivity adjustment for one or more motion sensors can provide for a suitable sensitivity range particularly for different game(s).

There may suitably be manually operable means for adjusting the level of sensitivity of the device, preferably at least one finger or thumb operable button.

For relative simplicity and compactness the at least one button and motion sensor means may be carried by the USB Flash Drive. Suitably, there may be two buttons.

The motion sensor means and the manually operable means may be programmable to any function of means for playing a computer game.

The means for playing the computer game may be selected from the group keyboard, mouse, gamepad, and remote controller.

The sensitivity adjustment means may comprise digital control, or analog control.

The motion sensor means is suitably adapted to measure any one of, or combination of any of tilt angle, angular velocity and acceleration of the USB Flash Drive.

There may be a plurality of motion sensor means.

The invention extends to a computer in combination with apparatus as hereinbefore defined.

Apparatus for controlling a computer game is hereinafter described, by way of example, with reference to the accompanying drawings.

Fig. 1 is a plan view of a first embodiment of apparatus according to the invention;

Fig. 2 is a block diagram of the apparatus of Fig. 1;

Fig. 3 is a plan view of a second embodiment of apparatus according to the invention;

Fig. 4 is a block diagram of the apparatus of Fig. 3; and

Fig. 5 is a block diagram of a modification of the second embodiment.

Referring to the drawings in which like parts are referred to by like numerals, there is shown apparatus 1, 100 for controlling a computer game, comprising motion sensor means 2 adapted to detect movement for control of a game being played by a user or player.

In the embodiments, the motion sensor means 2, hereinafter sensor(s) are an integral part of a USB Flash Drive 3, and can comprise an accelerometer, gyroscope, magnetic sensor and the like means. In the preferred embodiments an accelerometer is the sensor 2, and is used to detect motion either in 2D (x- and y- axes) or 3D (x-, y-, and z- axes). In either mode, the sensor 2 measures/monitors one or more of different parameters of the USB Flash Drive 3, for example tilt angle, angular velocity, acceleration of the USB Flash Drive.

In the first embodiment 1, the sensor 2 is added to or installed in a USB Flash Drive in a housing 4, which has two USB ports 5, 6. The housing 4 houses an integrated circuit 7, a memory 8, an MCU 9, which is a microcomputer or computer-on-a-chip. The MCU 9

is connected to the sensor 2 and to a variable or adjustable parameter input device 10 for adjusting the level of sensitivity of the sensor 2 via the MCU 9. The device 10 in the embodiment is in the form of manually operable i.e. finger or thumb operable, means such as a button. In the embodiment there are two buttons 11, 11' side by side at one end of the housing 4. The MCU 9 is connected to one USB port and the integrated circuit (IC) to a second USB port 5, both ports being of the USB Flash Drive.

As shown in Fig. 1, the two-port arrangement is used in conjunction with an extendable USB cable 12 plugged into one USB port 6 on the game controller side of the USB Flash Drive. It will be understood, however, that the USB extendable cable 12 can be omitted, in which case the USB Flash Drive is connected directly to the game controller.

Referring now to Fig. 3, this shows a plan view of a second embodiment of apparatus 100 embodying the invention, in which the sensor 2 motion-based game controller is merged with the USB Flash Drive in one USB port 5.

As shown in Fig. 4, the embodiment of Fig. 3 incorporates a switch 13 at the one USB port 5, while in the modification shown in Fig. 5, there is one USB port with a USB Hub 14.

In every embodiment shown, the sensor 2 is located in the centre of the USB Flash Drive 3. The USB Flash Drive 3 is connected via the USB cable 12 (Fig. 1) or directly (Fig. 3) to a computer or other USB console for playing a game.

The MCU 9, is programmable via its ROM, RAM or non-volatile memory and thus provides a programmable driver, the motion sensor 2 and the buttons 11, 11' being programmable to any key or function of the keyboard, mouse or gamepad of the apparatus 1, 100, for playing the computer game. As will be understood, the USB Flash Drive 3 can store the game(s), as can the installer of the programmable driver, while the motion-based game controller part (sensor) can handle the control of the game. With such a configuration, the (relatively small) USB Flash Drive 3 can function in all

embodiments as a flash memory to store data, game or driver and a programmable motion based game controller to manage control of the game with keyboard, mouse or gamepad functions.

It will be understood that apparatus embodying the invention as hereinbefore described with reference to the drawings allows a user to adjust the sensitivity of one accelerometer inside game controller(s) such as gamepad, joypad, joystick, gun controller etc. for computers. This is based on variable resistor(s) or variable capacitor(s) or other adjustable switch(s) to adjust level of the sensitivity of the accelerometer. Thus there is sensitivity adjustment for the motion sensor(s) in order to provide suitable sensitivity range(s) for different game(s).

Sensitivity adjustment is provided by a device which has two configurations, digital control and analog control. Digital control sensitivity adjustment is made possible by pressing the button(s) 11, 11' to increase or decrease the sensitivity level with the preset resolution. Analog control sensitivity adjustment is done by variable resistor or capacitor or other adjustable switch which can provide the analog output in order to adjust the sensitivity level with much higher resolution. These digital control and analog control sensitivity adjustment devices are connected to the micro processor or controller (MCU 9) which can adjust the sensor sensitivity level internally which means that the sensor output value is adjusted by the sensitivity adjustment devices 11, 11'. Then the MCU transmits control commands or adjusted sensor value to the computer or the game console. The sensitivity adjustment device includes a sensitivity adjustment algorithm and the hardware configuration of the device.

As an accelerometer is a device for measuring acceleration and can measure its own motion, using an accelerometer in a joypad it can function as analog sticks. As described above, there are two designs for this: 1) using 3D accelerometer to detect the tilt motion along x and y axis and behave as buttons; 2) using 2D accelerometer to detect the motion along x axis and y axis.

There is only one accelerometer in one joypad, so there is a selection button for choosing the Left Analog stick or Right Analogue stick. Besides, there is a button for mode selection. Users can enable/disable the motion sensing function by pressing the button. So the users can choose whether to use the motion sensor or Analog stick in different situations.

Joypads are also available for a computer. It can solve the problem of lack of joystick support in some computer games. With the programmable driver, the motion sensing game controller can also convert the joypad motions to control/input of the computer and function as both mouse and keyboard at the same time.

It will be understood that the term USB used herein generally refers to Universal Serial Bus which is bus, usually a cable bus, which supports data exchange between a host computer and a wide range of simultaneously accessible peripherals. The peripherals share USB bandwidth through appropriate protocol(s) and the USB allows peripherals to be attached, configured, used and detached whilst the host and other peripherals are in operation.

Thus in relation to this invention, the USB allows for motion of the game controller and can also provide for sensitivity adjustment of the game controller.

CLAIMS

1. Apparatus for controlling a computer game, comprising motion sensor means adapted to detect movement for control of the game.

2. Apparatus according to Claim 1, the motion sensor means being selected from a group comprising at least an accelerometer, gyroscope, magnetic sensor and visual sensor.

3. Apparatus according to Claim 1 or Claim 2, the motion sensor means being installed in a USB Flash Drive.

4. Apparatus according to Claim 3, the USB Flash Drive comprising a USB extendable cable.

5. Apparatus according to Claim 1 or Claim 2, the USB Flash Drive comprising one USB port, whereby the apparatus and USB Flash Drive are merged.

6. Apparatus according to Claim 5, comprising a USB switch.

7. Apparatus according to Claim 5, comprising a USB Hub.

8. Apparatus according to any preceding claim, the motion sensor means comprising an accelerometer means.

9. Apparatus according to Claim 8, the accelerometer means being adapted to measure acceleration along the x – and y – axes.

10. Apparatus according to Claim 8, the accelerometer means being adapted to measure acceleration along the x-, y – and z – axes.

11. Apparatus according to any preceding claim, comprising means adapted to adjust sensitivity of the motion sensor means.

12. Apparatus according to Claim 11, the said means comprising a variable or adjustable parameter input device for adjusting the level of sensitivity of the motion sensor means.

13. Apparatus according to Claim 12, the device being selected from the group variable resistor(s), variable capacitor(s) and adjustable input switch(es).

14. Apparatus according to Claim 13, comprising manually operable means for adjusting the level of sensitivity of the device.

15. Apparatus according to Claim 14, the manually operable means comprising at least one finger or thumb operable button.

16. Apparatus according to Claim 15, the at least one button and motion sensor means being carried by the USB Flash Drive.

17. Apparatus according to Claim 15 or Claim 16, there being two buttons.

18. Apparatus according to any of Claims 14 to 17, the motion sensor means and the manually operable means being programmable to any function of means for playing a computer game.

19. Apparatus according to Claim 18, the means being selected from the group keyboard, mouse, gamepad, and remote controller.

20. Apparatus according to any of Claims 11 to 19, the sensitivity adjustment means comprising digital control.

21. Apparatus according to any of Claims 11 to 19, the sensitivity adjustment means comprising analog control.

22. Apparatus according to any of Claims 9 to 21, the motion sensor means being adapted to measure any one of, or combination of any of tilt angle, angular velocity and acceleration of the USB Flash Drive.

23. Apparatus according to any preceding claim, there being a plurality of motion sensor means.

24. A computer in combination with apparatus according to any preceding claim.

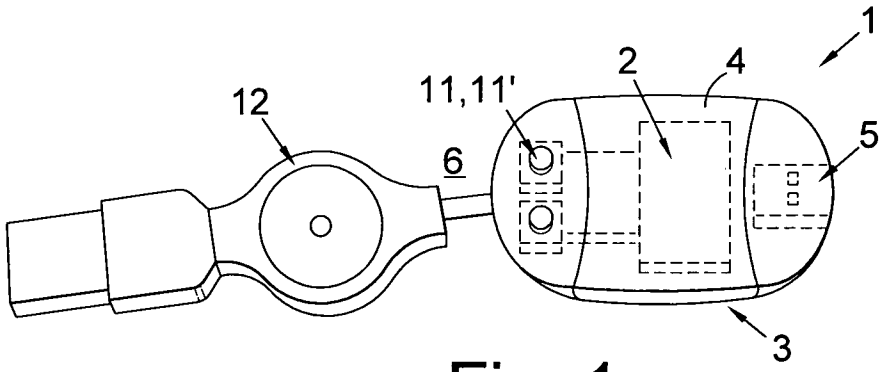


Fig. 1

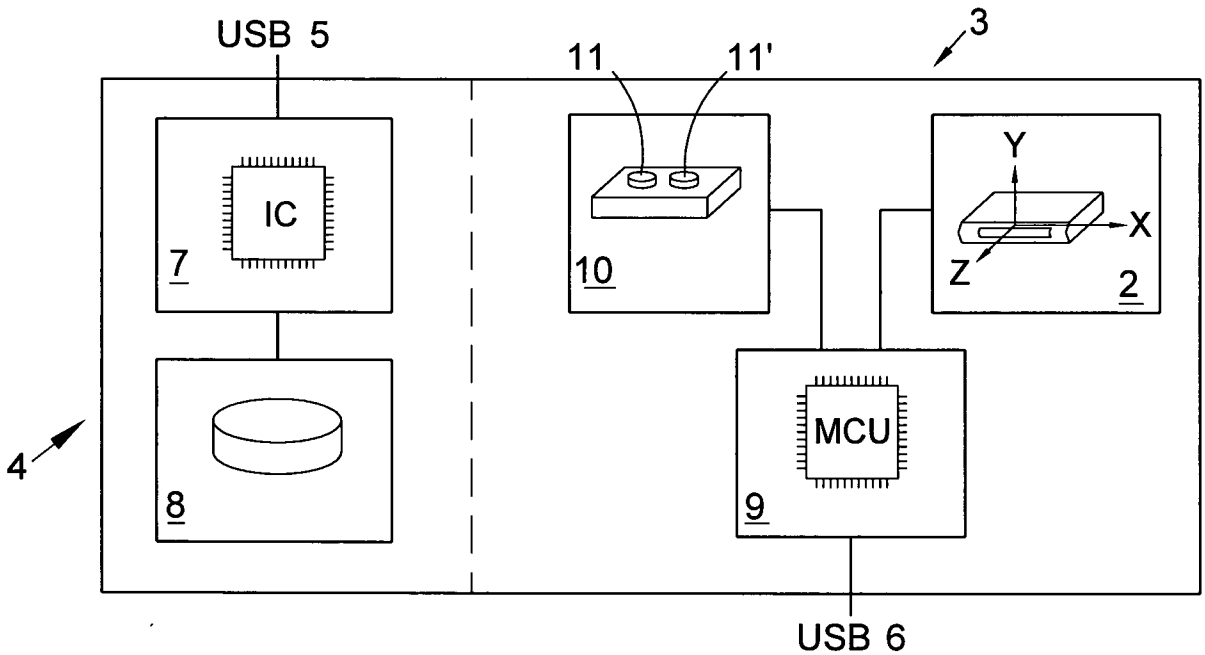


Fig. 2

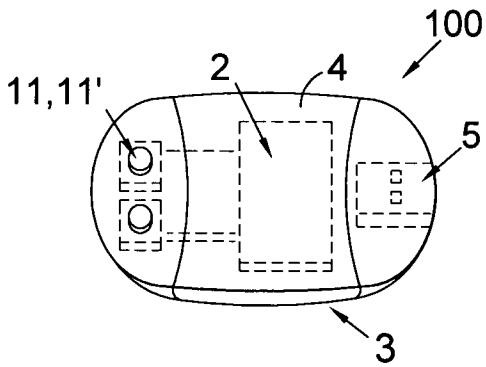


Fig. 3

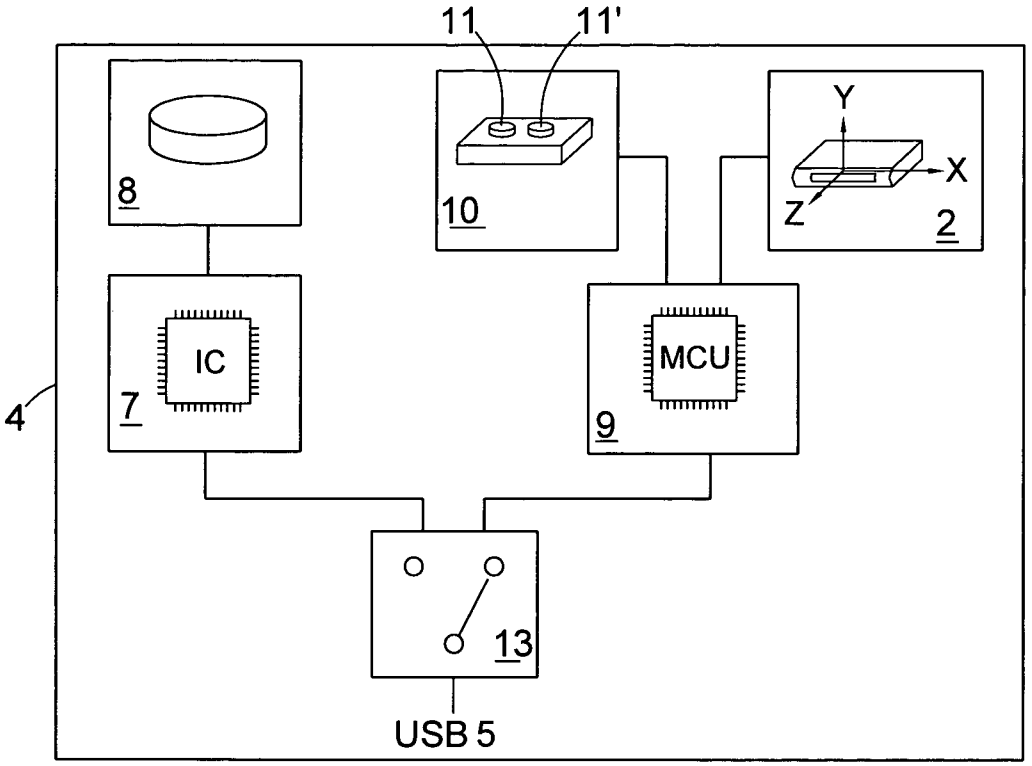
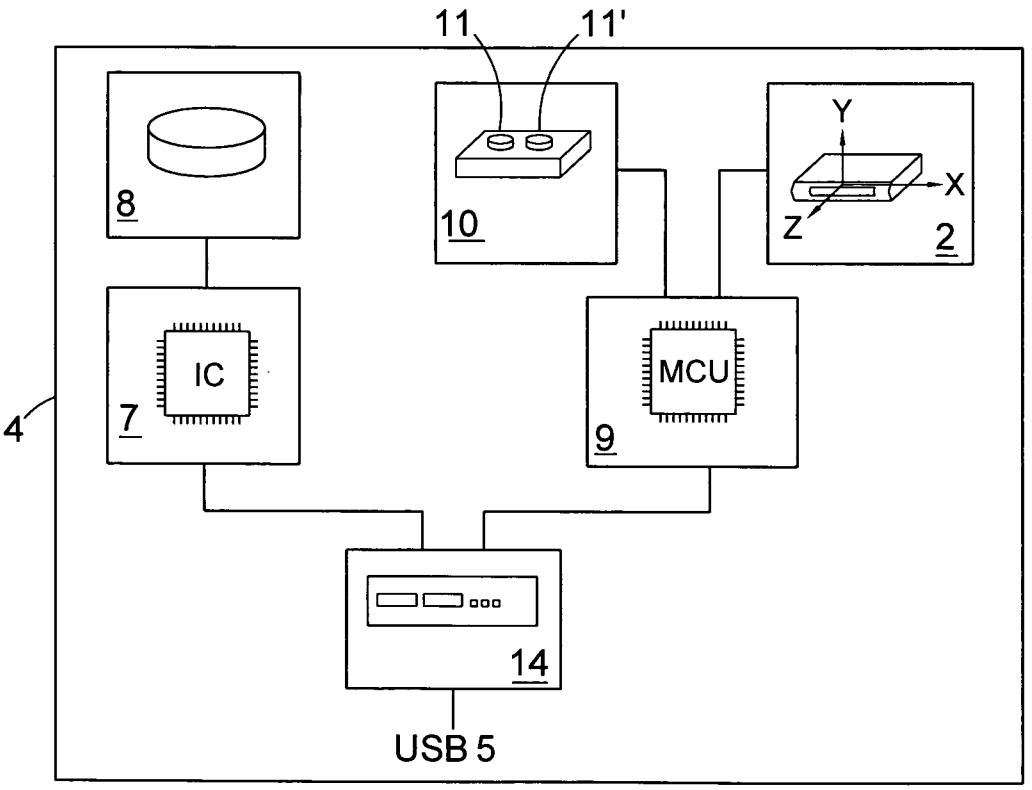

11
11'
8
10
Y
X
Z
2
IC
7
MCU
9
4
13
USB 5

Fig. 4


11
11'
8
10
Y
X
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7
MCU
9
4
14
USB 5

Fig. 5