



(19) **United States**

(12) **Patent Application Publication**
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(10) **Pub. No.: US 2006/0217197 A1**

(43) **Pub. Date: Sep. 28, 2006**

(54) **VIDEO GAME CONTROLLER WITH LIGHT FEEDBACK MECHANISM**

Publication Classification

(51) **Int. Cl.**
A63F 9/24 (2006.01)
(52) **U.S. Cl.** 463/36

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(57) **ABSTRACT**

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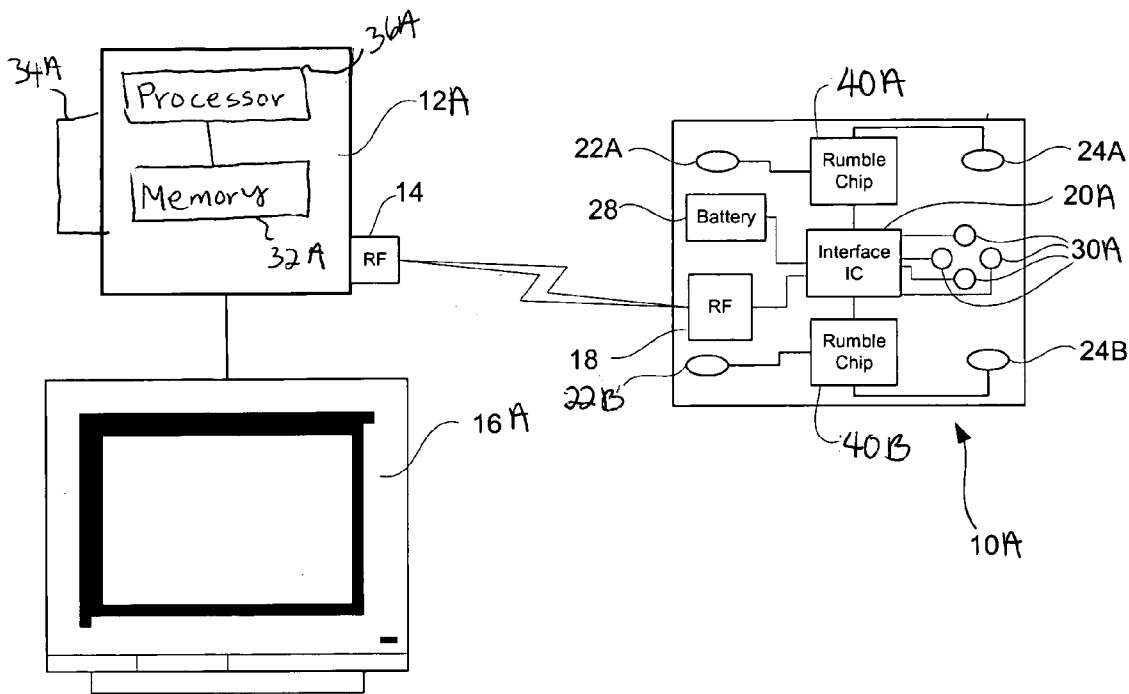
A video game controller including lights for providing visual feedback responsive to actions taking place in a video game. The visual feedback may be in terms of flashing lights, stationary lights, and the like. The lights are coupled to a rumble/vibration circuitry that controls any rumble/vibration motors that may be included in the game controller. If included, the rumble/vibration motors cause a rumble/vibration feeling in the controller during game play. Because the lights are coupled to the rumble/vibration circuitry, the lights are actuated each time signals are provided by the rumble/vibration circuitry, providing visual feedback that may complement or replace any tactile feedback from the rumble/vibration motors.

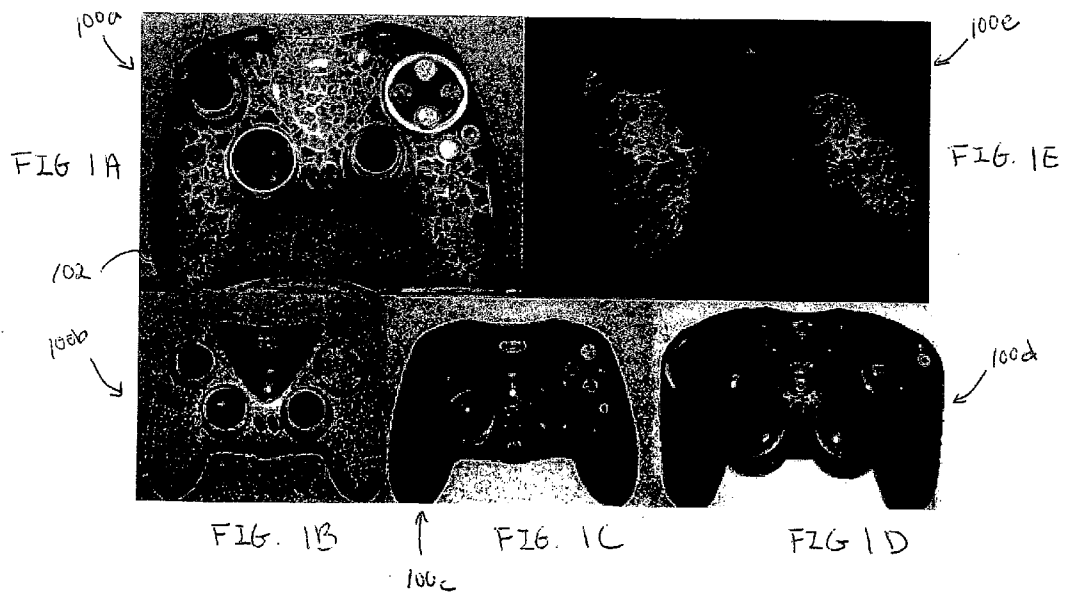
(21) Appl. No.: **11/312,134**

(22) Filed: **Dec. 19, 2005**

Related U.S. Application Data

(60) Provisional application No. 60/637,303, filed on Dec. 17, 2004.





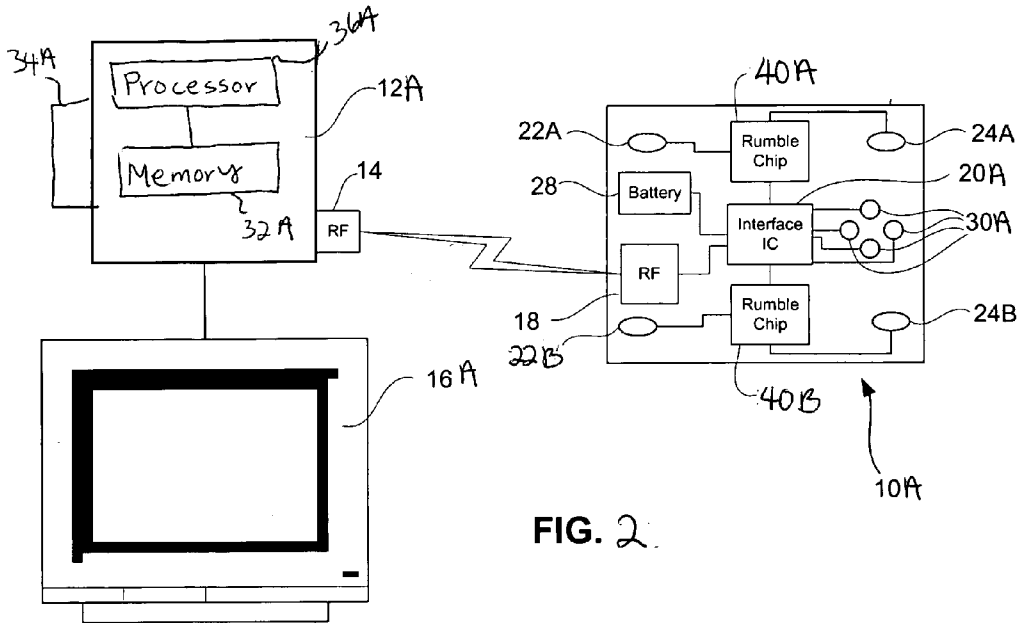


FIG. 2

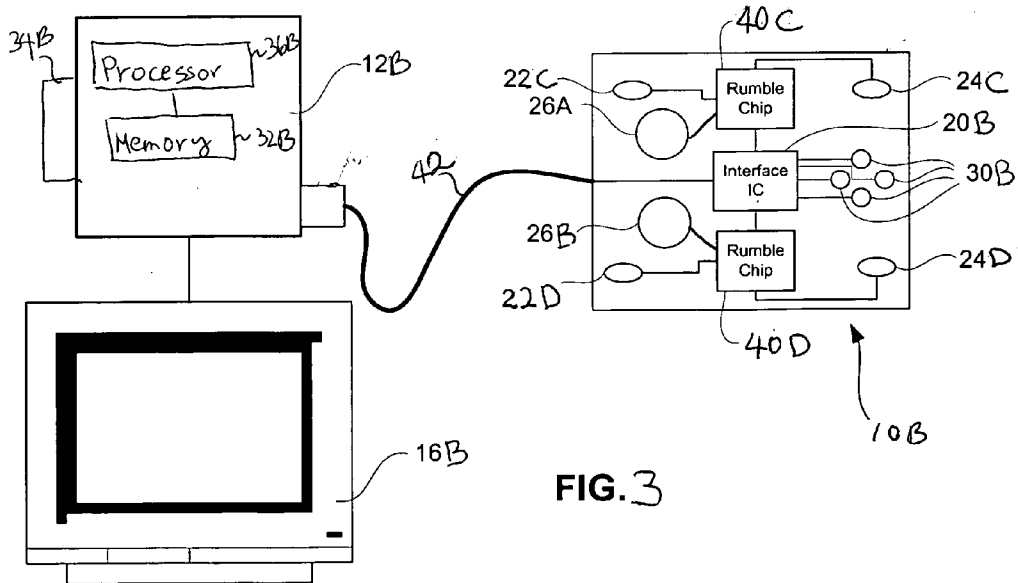


FIG. 3

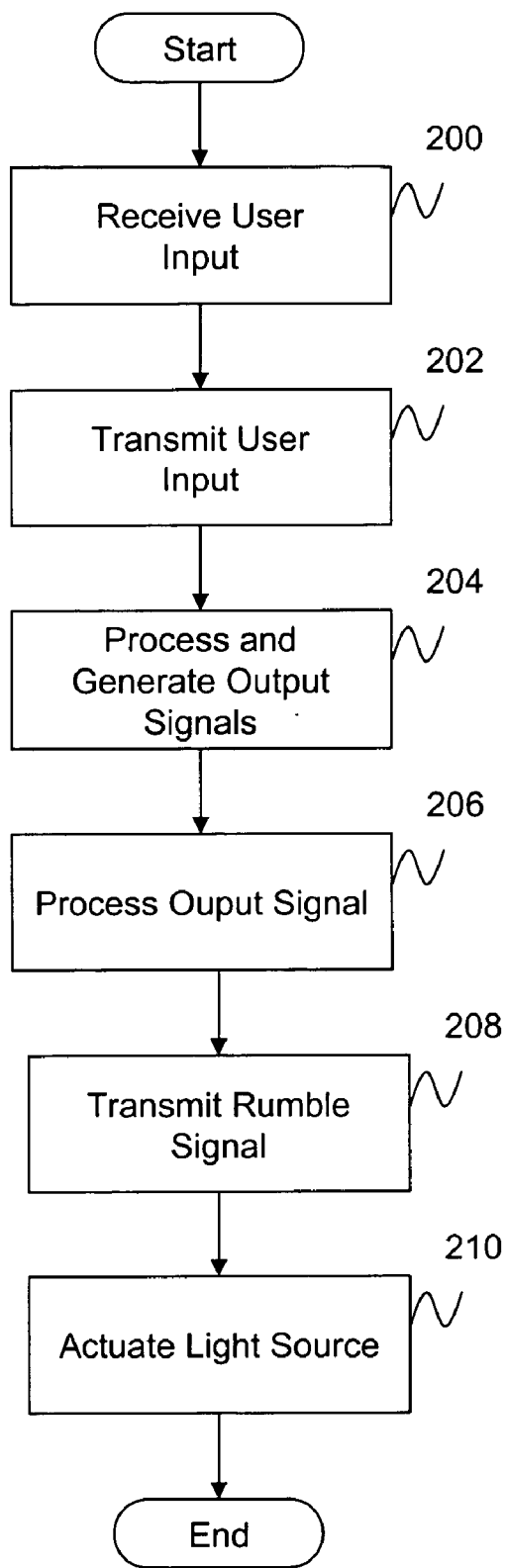


FIG. 4

VIDEO GAME CONTROLLER WITH LIGHT FEEDBACK MECHANISM

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of U.S. Provisional Application No. 60/637,303, filed on Dec. 17, 2004, the content of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] This invention relates to video game controllers, and more particular to video game controllers having a feedback feature that controls lights in the controller depending on the actions taking place in the game being played.

[0003] Video games, such as those that run on popular video game platforms such as Microsoft® XBox®, Sony® Playstation®, and Nintendo® GameCube® all include a game console unit that plays games stored on CD ROMs or DVDs. The game console unit connects to a video display, most commonly a television set, plasma display, etc. Connected to the console unit, either by cables or by a wireless connection, are game controllers with buttons, joysticks and/or other actuating devices. Some of the older styles of game consoles use replaceable game cartridges instead of CD ROMs or DVDs as the media for the games, but nonetheless, each employ a game controller for interfacing between the game and the player.

[0004] A game controller may incorporate what is termed a “force-feedback effect” or “rumble” feature, to cause the controller to vibrate in response to actions taking place in the game being played. This helps to provide tactile feedback to a player holding and using the game controller. For example, a player may feel feedback when tackled by an opposing linebacker, when cornering hard or crashing in a driving game, or shooting a shotgun. The vibration is generally generated by vibration/feedback motors that are controlled by circuitry which translate action in the game to activity at the motor(s) that causes a vibration or movement in the controller. The operation of these motor(s) consumes electricity at a relatively high rate compared to other features of the controller. In the case of wired controllers which derive their power from the console, the issue of power consumption is not of great concern. However, in the case of wireless devices which are powered by onboard batteries, battery life may be shortened due to the use of the rumble feature.

[0005] There are also game controllers which incorporate internal lights (e.g. different colored LEDs) inside a clear plastic body of the game controller. These lights provide a more interesting visual appeal to users when the game controller is in use. Since LED lights consume moderate amounts of power, use of LED lights does not place great additional power demands on wireless devices. In some cases, these lights remain statically lit. In other cases, the lights may randomly flash or flash in some predetermined pattern. However, the lights in these prior art game are not controlled based on feedback from the player’s interaction with the game. It would be appealing for feedback from the player’s interaction with a game to be visually appreciated at the game controller in lieu of or in addition to being provided by a rumble feature.

SUMMARY OF THE INVENTION

[0006] According to one embodiment, the present invention is directed to a video game controller for controlling a video game. The video game controller includes a controller housing, one or more light sources coupled inside the housing for emanating light through the housing, one or more input devices coupled to the exterior of the housing providing user input for controlling the video game, and circuitry coupled to the one or more light sources for actuating the one or more light sources responsive to actions occurring in the video game.

[0007] According to one embodiment of the invention, the circuitry for actuating the one or more light sources is circuitry configured to control one or more vibration motors for providing vibration of the controller housing. The one or more vibration motors may be included in the game controller. The one or more light sources may be actuated responsive to an output signal configured to control the one or more vibration motors.

[0008] According to one embodiment of the invention, at least a portion of the controller housing is made of a translucent material. The light sources emanate light through the portion of the controller housing made of the translucent material responsive to the actuation of the at least one light source.

[0009] According to another embodiment of the invention, a video game system includes a video console configured to execute game software for playing a video game and a controller coupled to the video console. The game software provides a feedback signal responsive to an occurrence in the video game. The controller is configured to provide user input for controlling progression of the video game. The controller includes a controller housing, one or more light sources coupled to the housing, and circuitry for actuating the one or more light sources responsive to the feedback signal.

[0010] According to another embodiment, the present invention is directed to a method for providing feedback via a video controller coupled to a video console during a video game. The method includes generating a feedback signal responsive to an occurrence in the video game, processing the feedback signal and generating an output signal configured to control one or more vibration motors, and actuating one or more light sources in the video controller responsive to the output signal.

[0011] According to one embodiment of the invention, the light sources are actuated in lieu of the vibration motors.

[0012] According to one embodiment of the invention, the video controller includes the one or more vibration motors, and the light sources are actuated in addition to the vibration motors.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

[0014] FIGS. 1A-1E are top and side perspective views of an exemplary video game controller with a light feedback mechanism according to one embodiment of the invention;

[0015] **FIG. 2** is a block diagram of a wireless game controller with a light feedback mechanism coupled to a video game console and monitor according to one embodiment of the invention;

[0016] **FIG. 3** is a block diagram of a wired game controller with a light feedback mechanism and vibration motors coupled to a video game console and monitor according to one embodiment of the invention; and

[0017] **FIG. 4** is a flow diagram of a game controller light feedback mechanism according to one embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018] In general terms, an embodiment of the present invention provides a wireless and/or wired video game controller with one or more light sources coupled to a rumble/vibration circuitry included in the controller. The lights from the light sources provide visual feedback to a player for actions occurring in a game that is being played. In the case of a wired controller, the lights that provide the visual feedback may be included in addition to vibration motor(s) which provide tactile feedback to the player. In the case of a wireless controller, the rumble motor(s) may be eliminated for purposes of limiting power consumption. In this case, only lights are provided to provide visual feedback. The visual feedback may be in terms of flashing lights, stationary lights, or other types of light display mechanism that should be appreciated by a person of skill in the art. Furthermore, one portion of the game controller may display one light color while another portion of the game controller may display a different light color. Furthermore, the portions of the game controller that may be lit may differ depending on the actions taken during the game.

[0019] **FIGS. 1A-1D** are top perspective views of various exemplary video game controllers **100a-100d** according to one embodiment of the invention. **FIG. 1E** is a side perspective view of an exemplary video game controller **100e** according to one embodiment of the invention. Each illustrated controller includes a housing **102** which has all or portions made of a transparent or translucent material to allow one or more lights inside the housing to shine through. The lights may be controlled to cause the housing to appear in a particular color, and/or to cause the housing to display a particular pattern or color pattern. According to one embodiment, the transparent portions of the housing are laid out in such a manner that when one or more lights inside the housing are lit, they provide a crackle-type paint effect on the housing. Alternatively, the crackle-type paint effect may be provided by the layout of the light sources inside the housing. The crackle-type paint effect may be provided in a single or multiple stationary and/or flashing colors.

[0020] Although the lights are described as residing inside the housing of the game controller, a person of skill in the art should appreciate that all or portions of the lights may also be located outside of the housing.

[0021] According to another embodiment of the invention, in lieu or in addition to the lights, digital ink may be employed on the housing **102** to cause the display of particular shapes, patterns, or letters.

[0022] **FIG. 2** is a block diagram of a wireless game controller **10A** with a light feedback mechanism according

to one embodiment of the invention. The wireless controller **10A** connects to a video game console **12A** with a wireless interface, such as, for example a radio frequency (RF) interface **14**. The video game console **12A** is in turn connected to a monitor **16A** which may be, for example, a plasma display, television monitor, computer monitor, or the like.

[0023] The video game console **12A** includes a memory **32A** storing computer program instructions which, when executed by a processor **36A**, cause the processor to interact with a disc or cartridge reader **34A** to read game software for playing a game. The game software may be provided on a CD, DVD, memory cartridge, or any storage device conventional in the art. The game console **12A** may also be equipped with a network connection (not shown) for downloading the game software into the memory **32A** over a wired or wireless local area network, a private wide area network, or a public wide area network such as the Internet.

[0024] The game software communicates with the game console **12A** to display text, graphics, and/or video associated with the game. The game software also communicates with the wireless game controller **10A** to receive user input that controls the progression of the game. The game software further transmits to the game controller signals used by the controller to provide visual feedback to the player in response to actions taken during the game.

[0025] In the illustrated embodiment, the wireless game controller **10A** has a wireless transponder, such as, for example, an RF chip **18**. The RF chip **18** is connected to an interface chip **20A**, which in turn is connected to one or more rumble/vibration chips **22A, 22B**. The rumble chips **22A, 22B** may be similar to the rumble chips provided in game controllers manufactured for Sony® PlayStation® 2, Microsoft® Xbox®, and Nintendo® GameCube® video game consoles. However, instead of using the output of the rumble chips to control rumble/vibration motors to provide a rumble/vibration feeling in the controller during game play, the rumble chips **22A, 22B** in the illustrated embodiment are used for controlling one or more light sources, such as LEDs **22A, 22B, 24A, and 24B**. In this regard, the rumble chips **40A, 40B** are coupled to the LEDs **22A, 24A, 22B, and 24B**, and each time the game software triggers the rumble chips **40A, 40B**, one or more of the LEDs are actuated in response. As an example, in a game where guns are being fired, one or more LEDs may be actuated to flash a light each time the player's character fires or gets fired upon. Because the light sources consume less power than the rumble/vibration motors, power may be preserved while allowing feedback to the player.

[0026] The LEDs **22A, 22B, 24A, and 24B** may be different colors (or multicolor) LEDs for added visual impact, with, for example, different color effects being produced in response to different signals from the rumble chips **40A, 40B**. Just by way of example, a red LED may flash in response to a "gun fire" signal from the rumble chips while a white LED may flash in response to a "lightning" signal from the rumble chips.

[0027] According to the illustrated wireless embodiment, an on-board power supply, such as batteries **28**, supply power for the wireless controller **10A**. Various input devices **30A** such as buttons, switches, joysticks, mouse pad, voice

and/or motion activation units, and the like are coupled to the interface chip 20A for allowing a user to interact with the game.

[0028] FIG. 3 is a block diagram of a wired game controller 10B with a light feedback mechanism according to one embodiment of the invention. The wired game controller 10B is coupled to a game console 12B which in turn connects to a game monitor 16B similar to the game monitor 16A of FIG. 2. The game console 12B includes a processor 36B, memory 32B, and disc or cartridge reader 34B which may be similar to the processor 36A, memory 32A, and disc or cartridge reader 34A of FIG. 2.

[0029] The wired game controller 10B includes an interface chip 20B coupled to input devices 30B and one or more rumble chips 40C, 40D. The rumble chips 40C, 40D are in turn coupled to one or more light sources, such as LEDs 22C, 22D, 24C, 24D. The interface chip 20B, input devices 30B, rumble chips 40C, 40D, and LEDs 22C, 22D, 24C, 24D are similar to the interface chip 20A, input devices 30B, and rumble chips 40A, 40B, and LEDs 22A, 22B, 24A, 24B of FIG. 2.

[0030] Unlike the wireless embodiment of FIG. 2, however, the wired controller 10B in FIG. 3 derives its power from the video game console 12B via a power cable 42 instead of a battery. Thus, unlike the wireless embodiment where no vibration motors are included to limit power consumption, the wired embodiment includes one or more vibration motors 26A, 26B to provide a rumble/vibration effect. The rumble chips 40C, 40D according to this embodiment are coupled to the vibration motors 26A, 26B as well as to the LEDs 22C, 22D, 24C, 24D. The rumble/vibration motors interact with the game software to provide a rumble/vibration feeling in the controller during game play. Some common examples include the feedback a player feels when being tackled by an opposing linebacker in a football game, when cornering hard or crashing in a driving game, or shooting a shotgun and feeling its tactical kick. However, because the rumble chips 40C, 40D are also coupled to the light sources, a signal emanating from the rumble chips 40C, 40D in response to the player's interaction with the game not only causes the rumble motors 26A, 26B to be activated, but also causes the activation of the LEDs to create a complementary light flashing or stationary light feature. The lights provide visual appeal and feedback in addition to the tactile feedback from the rumble motors 26A, 26B.

[0031] A person of skill should appreciate that in addition to the use of the rumble chips 40A, 40B, 40C, 40D (collectively referenced as 40), other chips or devices may be used in lieu or in addition to the rumble chips to provide the visual feedback to the player. For example, the various light sources may be coupled to one or more speaker units (not shown) included in the controller or game console to activate the lights in response to certain types of audio output. The light sources may also be directly coupled to the control buttons, switches, and the like to cause different lights to shine or flash in response to the actuation of different control buttons, switches, and the like. Furthermore, the interface chip 20A, 20B may be programmed to control the light sources directly, allowing the lights to be activated even when the rumble chips are not activated.

[0032] FIG. 4 is a process flow diagram of a game controller light feedback mechanism according to one

embodiment of the invention. The process may be a software process, portions of which is executed by the processor 36A, 36B and portions of which is executed by the interface chip 20A, 20B. A person of skill of art should recognize, however, that the process may be implemented via hardware, firmware, or a combination of hardware, firmware, and/or software. Furthermore, the various steps of the process may be implemented in the indicated order, or in any other order that should be appreciated by a person of skill in the art.

[0033] In step 200, the interface chip 20A, 20B receives a player's actuation of the input device 36A, 36B for controlling the progression of the game. In step 202, the user input is transmitted to the game software executed by the processor 36A, 36B in the game console 12A, 12B. The game software processes the user input in step 204 and provides one or more output signals in response. A portion of the output signals are transmitted to the game console to control the display on the game monitor 16A, 16B. Other portions of the output signals are transmitted to the game controller 10A, 10B and processed by the interface chip 20A, 20B in step 206. The portion of the output signal processed by the interface chip may be a feedback signal indicative of a type of feedback to provide to the player in response to the user action taken or a particular occurrence in the game.

[0034] In step 208, the interface chip transmits a rumble signal corresponding to the feedback signal to the rumble chips 22. The rumble chips 22 are then actuated to control any rumble motors that may be coupled to the rumble chips 22. Because the rumble chips 22 are also coupled to the LEDs 22A-D, 24A-D, one or more LEDs are also actuated in step 210 each time the rumble chips are actuated to provide visual feedback to the user. The rumble signal controls which LEDs are actuated as well as other LED lighting parameters such as, for example, the length of time in which they are actuated, the brightness of the lights, the timing of the actuation, and the like.

[0035] Although this invention has been described in certain specific embodiments, those skilled in the art will have no difficulty devising variations to the described embodiment which in no way depart from the scope and spirit of the present invention. Furthermore, to those skilled in the various arts, the invention itself herein will suggest solutions to other tasks and adaptations for other applications. It is the Applicant's intention to cover by claims all such uses of the invention and those changes and modifications which could be made to the embodiments of the invention herein chosen for the purpose of disclosure without departing from the spirit and scope of the invention. Thus, the present embodiments of the invention should be considered in all respects as illustrative and not restrictive, the scope of the invention to be indicated by the appended claims and their equivalents rather than the foregoing description.

What is claimed is:

1. A video game controller for controlling a video game comprising:

a controller housing;

one or more light sources coupled inside the housing for emanating light through the housing;

one or more input devices coupled to the exterior of the housing providing user input for controlling the video game; and

circuitry coupled to the one or more light sources for actuating the one or more light sources responsive to actions occurring in the video game.

2. The video game controller of claim 1, wherein the circuitry for actuating the one or more light sources is circuitry configured to control one or more vibration motors for providing vibration of the controller housing.

3. The video game controller of claim 2 further comprising the one or more vibration motors.

4. The video game controller of claim 1, wherein the one or more light sources are actuated responsive to an output signal configured to control the one or more vibration motors.

5. The video game controller of claim 1, wherein at least a portion of the controller housing is made of a translucent material.

6. The video game controller of claim 5, wherein the light sources emanate light through the portion of the controller housing made of the translucent material responsive to the actuation of the at least one light source.

7. A video game system comprising:

a video console configured to execute game software for playing a video game, the game software providing a feedback signal responsive to an occurrence in the video game; and

a controller coupled to the video console configured to provide user input for controlling progression of the video game, the controller including a controller housing, one or more light sources coupled to the housing, and circuitry for actuating the one or more light sources responsive to the feedback signal.

8. The video game system of claim 7, wherein the circuitry for actuating the one or more light sources is circuitry configured to control one or more vibration motors for providing vibration of the controller housing.

9. The video game system of claim 8 further comprising the one or more vibration motors.

10. The video game system of claim 8, wherein the one or more light sources are actuated responsive to an output signal configured to control the one or more vibration motors.

11. The video game system of claim 7, wherein at least a portion of the controller housing is made of a translucent material.

12. The video game system of claim 11, wherein the light sources emanate light through the portion of the controller housing made of the translucent material responsive to the actuation of the at least one light source.

13. A method for providing feedback via a video controller coupled to a video console during a video game, the method comprising:

generating a feedback signal responsive to an occurrence in the video game;

processing the feedback signal and generating an output signal configured to control one or more vibration motors; and

actuating one or more light sources in the video controller responsive to the output signal.

14. The method of claim 13, wherein the light sources are actuated in lieu of the vibration motors.

15. The method of claim 13, wherein the video controller includes the one or more vibration motors.

16. The method of claim 15, wherein the light sources are actuated in addition to the vibration motors.

17. The method of claim 13, wherein the light sources reside inside a controller housing, at least a portion of which is made of a translucent material, the light sources emanating light through the portion of the housing made of the translucent material responsive to the actuation of the one or more light sources.

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