GAME CONTROLLER CONNECTION SYSTEM AND METHOD OF SELECTIVELY CONNECTING A GAME CONTROLLER WITH A PLURALITY OF DIFFERENT VIDEO GAMING SYSTEMS

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ABSTRACT
A game controller, according to the present invention, interacts with a plurality of different game processors including different gaming applications utilizing a communication link. The game controller includes a plurality of user-manipulable input devices, and at least one signal processor to receive and process signals associated with manipulations of the user-manipulable input devices and to communicate with a plurality of different game processors. The communication link includes a plurality of connection plugs, where at least two of the connection plugs are configured to connect with different game processors. In addition, the communication link may facilitate wired or wireless transfer of signals between the at least one signal processor and a selected game processor, where a wired transfer may employ an extension cable to cover greater distances.
FIG. 3A
GAME CONTROLLER CONNECTION SYSTEM AND METHOD OF SELECTIVELY CONNECTING A GAME CONTROLLER WITH A plurality OF DIFFERENT VIDEO GAMING SYSTEMS

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention pertains to controllers for entertainment systems. In particular, the present invention pertains to a game controller connection system that is configured to selectively connect a game controller to a plurality of different video gaming systems.

[0003] 2. Discussion of the Related Art

[0004] Generally, video gaming systems employ controllers with one or more joysticks or other game controllers to enable a user to interact with a gaming application. A wide variety of video gaming systems are commercially available. Examples of different gaming systems include PlayStation 2 or PS2 available from Sony Corporation, XBOX available from Microsoft Corporation and GAMECUBE available from Nintendo Corporation. In addition, many personal computers with different operating systems (e.g., Microsoft WINDOWS and Apple Mac OS X) offer video gaming software that is further suited to connect with joystick or other game controllers (e.g., via a USB port) for enabling user interaction via the joystick controller during a gaming application.

[0005] In addition, the widespread popularity associated with video game playing has led to the development of universal game controllers that are configured for use with one or more different video gaming systems. Universal game controllers that are particularly popular are of the type that accommodate user preferences and/or provide certain non-conventional features that may be of interest to a particular user. For example, certain universal game controllers integrate exercise and fitness with video games, where the universal game controller provides some level of resistance during use with a video gaming system to force the user to engage in some form of physical exertion in order to manipulate the game controller and thus interact with a gaming application.

[0006] One problem associated with providing a universal game controller for use with different gaming systems is that there is not one common or standard connection port associated with the different video gaming systems. Rather, each gaming system typically includes its own individual and unique connection port for connection with a game controller, such that the game controller connection port for one video gaming system (e.g., GAMECUBE) is often significantly different in configuration in comparison to the game controller port of another video gaming system (e.g., XBOX). Thus, many conventional universal game controllers are designed with a connecting cable that is configured for use with a single gaming system, which requires a user to purchase two or more of the same type of universal game controller of interest in order to connect this type of game controller to two or more different gaming systems.

[0007] Other conventional universal game controllers have been designed to include two or more adaptors that facilitate connection between a single joystick controller and two or more different gaming systems by connecting a different adaptor between a connection port of the joystick controller and a particular gaming system of interest. However, the different adaptors are often sold as separate accessory components for this type of joystick controller. In addition, some adaptors are difficult to obtain commercially for particular types of gaming systems. Further, depending upon the number of different gaming systems to which the universal game controller is to be connected, adaptors can become cumbersome and can be easily misplaced.

OBJECTS AND SUMMARY OF THE INVENTION

[0008] Accordingly, it is an object of the present invention to employ a configurable game controller with a variety of different gaming systems to enable a user to assign functions of a gaming application to desired game controller input devices (e.g., joystick, buttons, mouse, etc.).

[0009] Another object of the present invention is to employ a single game controller and effectively connect and communicate with a variety of different gaming systems while minimizing the expense and eliminating the need for multiple adaptors that must be provided with each gaming system.

[0010] A further object of the present invention is to employ a configurable game controller with a wide variety of “off the shelf” games or other software programs.

[0011] Yet another object of the present invention is to employ a configurable game controller with an exercise system to enable selection of exercise device usage and/or manipulation of game controller input devices to control desired functions of gaming applications for a variety of different video gaming systems.

[0012] The aforesaid objects are achieved individually and/or in combination, and it is not intended that the present invention be construed as requiring two or more of the objects to be combined unless expressly required by the claims attached hereto.

[0013] According to the present invention, a game controller interacts with a plurality of different game processors including different gaming applications utilizing a communication link. The game controller includes a plurality of user-manipulable input devices, and at least one signal processor to receive and process signals associated with manipulations of the user-manipulable input devices and to communicate with a plurality of different game processors. The communication link includes a plurality of connection plugs, where at least two of the connection plugs are configured to connect with different game processors. In addition, the communication link facilitates transfer of signals between the at least one signal processor and a selected game processor when the selected game processor is connected with a respective connection plug.

[0014] The present invention provides several advantages. In particular, the present invention facilitates the connection of a single game controller to a wide variety of different gaming systems without the requirement of purchasing separate components (e.g., different adaptors or controllers with different connector configurations). The system is further designed to connect unique game controllers, such as exercise devices, with a wide variety of different video gaming systems.
The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of specific embodiments thereof, particularly when taken in conjunction with the accompanying drawings wherein like reference numerals in the various figures are utilized to designate like components.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagramatic illustration of a gaming or entertainment system employing configurable controllers according to the present invention.

FIG. 2 is a schematic block diagram of a configurable controller according to the present invention.

FIGS. 3A-3C are perspective views of exercise systems serving as gaming controllers according to the present invention.

FIG. 4 is a schematic block diagram of an exemplary control circuit for the exercise systems of FIGS. 3A-3C.

FIG. 5 is a view in perspective of a controller of the exercise systems of FIGS. 3A-3C, including a cable connector according to the present invention.

FIG. 6 is an exploded view in perspective of the exercise system of FIG. 3C including a cable connector system connecting the exercise system to a video gaming system according to the present invention.

FIG. 7 is a schematic block diagram of an exemplary communication or connector system enabling communication between a controller employing one or more processors and a number of different video gaming systems according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A gaming or entertainment system employing configurable controllers according to the present invention is illustrated in FIG. 1. Specifically, the gaming system includes one or more controllers 12, a game processor 14 and a monitor or display 16. The game processor includes a storage drive and/or unit to receive computer readable media (e.g., CD, DVD, etc.) containing software for various games and a processing device to execute the software to provide games on monitor 16. The game processor may be implemented by any conventional or other processor (e.g., microprocessor, personal computer, video gaming processor, etc.). For example, the game processor may be implemented for use with conventional video gaming systems including, without limitation, PS2 available from Sony Corporation, XBOX available from Microsoft Corporation, and GAMECUBE available from Nintendo Corporation. The monitor is typically implemented by a conventional television or other display. The games generally include characters or objects that are controlled by a user via game controllers 12. For example, the user may control movement and actions of a character or a vehicle (e.g., car, airplane, boat, etc.) to move through a virtual environment displayed on monitor 16. The controllers include a plurality of input devices (e.g., joystick, buttons, etc.) to enable a user to interact with the game. The game processor receives signals from the controllers and updates the display to reflect the movements and/or actions of the character or object as indicated by user manipulation of the controller.

An exemplary configurable controller according to the present invention is illustrated in FIG. 2. Initially, controller 12 may be of the type commonly employed for video games and further includes components to enable assignment of controller input devices to game functions as described below. For example, controller 12 may be of the type used for conventional gaming systems (e.g., PS2, XBOX, GAMECUBE, etc.), such as the type disclosed in U.S. Pat. No. 6,231,444, the disclosure of which is incorporated herein by reference in its entirety. Specifically, controller 12 includes input devices 20, signal sources 22 each associated with an input device, a switching device or matrix 24 and a switch control unit 26. Input devices 20 are each manipulable by a user to enter information or perform some action within a game. These devices may be any conventional or other controller input devices (e.g., button, switch, joystick, etc.).

The input devices are each coupled to one or more corresponding signal sources 22. The signal source basically detects or measures manipulation of the corresponding input device and produces a signal indicating the measurement or detection. The signal source may be implemented by any conventional or other components (e.g., switch, contact, variable resistor or potentiometer, etc.). By way of example only, a controller input device (e.g., joystick, button, trigger, directional pad, etc.) may have each particular axis of motion be associated with a respective signal source in the form of a variable resistor or potentiometer whose resistance varies in accordance with device motion along that axis. The signal source produces a signal indicating a measurement of device motion along the corresponding axis.

The signals produced by signal sources 22 are processed by a signal processor 28. The signal processor may be in the form of game processor 14 (FIG. 1), or a conventional or other processor that arranges the signal information into a format compatible with game processor 14. The inputs of signal processor 28 are conventionally coupled in a fixed manner to specific controller signal sources. Thus, the signal processor or game processor knows the controller input device associated with each input and maps game functions to those inputs (or controller input devices) in accordance with the assignments within the game software.

In order to selectively configure controller 12 for game functions, the controller includes switching device 24 and switch control unit 26. The switching device basically enables information for controller input devices to be selectively placed on signal processor inputs corresponding to the desired game functions. For example, gaming software may assign a car accelerator function to a controller left joystick and maps that function to a particular signal processor input expecting information from the left joystick. However, the switching matrix may couple the signal source of the right joystick to that signal processor input, where the game processor processes the right joystick information for the accelerator function, thereby enabling the right joystick to perform that function. Thus, the controller input devices may be selectively assigned to game functions absent knowledge by the gaming software.
The switching device receives information from each signal source and is coupled to the inputs of signal processor 28. The switching device may be implemented in hardware and/or software by any conventional or other devices capable of switching signals (e.g., switches, multiplexers, processors, cross-bar switches, switching matrix, gate arrays, logic, relays, etc.). The particular switching device embodiment utilized may depend upon the number of controller input devices and level of function assignment or blending desired. For example, in order to exchange functions between joysticks each with motion along an axis (e.g., to swap left-right joystick motion corresponding to a steering function or forward and backward joystick motion corresponding to an accelerator function), two double-pole double-throw switches may be utilized. The switches basically couple the signal sources of the joysticks (e.g., potentiometers measuring motion along the axis) to the signal processor inputs corresponding to the desired functions. Thus, the functions of each joystick may be performed by the other (e.g., swapped) or one joystick may perform both functions (e.g., steering and accelerator) in accordance with the connections. Applications of higher complexity with respect to blending functions may require additional selector switches and various combinations of selector switch settings.

The switching device may be implemented by devices that can switch signals in the analog or digital domain. For example, the switching device may be implemented by a processor or router that receives signals from the signal sources and directs the signals to the signal processor inputs corresponding to the desired functions. These tasks may be accomplished in software. The switching device switches signals in accordance with controls from a switch control unit 26. The switch control unit may include one or more controls disposed on controller 12, where the controls are manipulable by a user to configure the switching device directly. Alternatively, the switch control unit may include a control processor to control the switching device in accordance with the controls to achieve the desired function assignment. The controls may be implemented by any conventional or other input devices (e.g., buttons, keys, slides, etc.) to provide control signals to the switching device or control processor.

The switching device or switch control unit may alternatively provide a user interface to enable the user to enter information to configure the controller in the desired manner. The interface may be in the form of screens on a controller display or controller lights or other indicators. Further, the interface may be shown on display 16 and implemented by game processor 14. The switch control unit receives the configuration information entered by a user and controls switching device 24 to provide the appropriate signals to signal processor 28 to attain the desired configuration or function assignment.

Operation of the controller is described with reference to FIGS. 1-2. Initially, a user places a storage medium containing gaming software in game processor 14 to commence a gaming session. The user determines the controller input devices desired for the particular game functions and manipulates controls on controller 12 for the desired configuration. Switch control unit 26 controls switching device 24 to establish connections between the appropriate controller input devices and signal processor inputs corresponding to the desired functions as described above in order to achieve the desired function assignment. During the gaming session, the user manipulates the controller input devices, where the game processor receives signals for the gaming functions from the respective controller input devices as prescribed by the user and processes the signals to update the display in accordance with the user manipulation.

The game controller of the present invention may be utilized in various applications. In particular, the game controller may be employed within an exercise device used as a peripheral to a gaming system as illustrated in FIGS. 3A-3C. Initially, the exercise system may be of the types disclosed in U.S. patent application Ser. No. 10/975,185, entitled “Configurable Game Controller and Method of Selectively Assigning Game Functions to Controller Input Devices” and filed Oct. 28, 2004 and U.S. patent application Ser. No. 10/309,565, entitled “Computer Interactive Isometric Exercise System and Method for Operatively Interconnecting the Exercise System to a Computer System for Use as a Peripheral” and filed Dec. 4, 2002, the disclosures of which are incorporated herein by reference in their entirety. The exercise system basically serves as a game controller to provide user information to game processor 14 (FIG. 1) and enable the user to interact with the game in accordance with exercise performed by the user on the system as described below.

Referring to FIG. 3A, system 100 includes a frame 90 with a base 92 including elongated first base members 101 and elongated second base members 102. The second base members are each attached at a corresponding end of the first base members via brackets or clamps 109 to form an “I” configuration for the base. The first base members basically extend substantially in parallel between the second base members and are separated by a slight distance.

The second base members engage a support surface and include a slight curved configuration to suspend the first base members slightly above that surface. The second base member at the front of the system includes grips 105 disposed at each end and extending rearward thereof to provide a gripping surface for user feet and to stabilize the system frame. A support 103 configured to support a user lower body portion (e.g., buttocks) is secured to a rear portion of the first base members via a bracket or clamp 108. Support 103 includes a substantially upright post 104 and a support member 106 attached to the top of the upright post to form a “T” type configuration. The support member includes a curved configuration to contour a user body portion and pads 107 extending inward from each support member end to enhance user comfort.

The frame further includes an effector bar 110 for manipulation by a user. In particular, effector bar 110 is attached, via a bracket or clamp 111, to first base members 101 proximate front second base member 102. The effector bar is substantially upright and preferably modular and is constructed of a suitably rigid material (e.g., a metal alloy) that is capable of being slightly deflected within its elastic limit in response to any combination of bending, twisting, tension and compression forces applied by the user to the bar. While the effector bar is generally cylindrical, it is noted that the effector bar may be of any suitable shape (e.g., bent or curved, V-shaped, etc.) and have any suitable exterior
A controller 120 is attached or secured to the effector bar upper portion. The controller may be of the type available for conventional video games (e.g., PS2 available from Sony, XBOX from Microsoft, GAMECUBE available from Nintendo, video gaming applications configured for use with personal computer operating systems such as Microsoft WINDOWS and Apple Mac OS X, etc.), such as the device described in aforementioned U.S. Pat. No. 6,231,444, and is similar to controller 12 described above. The controller preferably includes a series of buttons 123 and a joystick 121 disposed on the controller upper portion. The joystick and effector bar may be selectively configured or assigned to game functions as described below. Basically, effector bar 110 serves the function of a second controller joystick with respect to a game. The controller generally includes respective signal sources (e.g., variable resistor or potentiometers) to provide signals indicating joystick motion along X (e.g., left/right motions) and Y (e.g., forward/backward motions) axes. However, the controller may include any quantity of any type of input devices (e.g., buttons, switches, a keypad, joystick, etc.) and signal sources disposed at any location and arranged in any fashion on the controller. The buttons and joystick may be utilized to enter any desired information (e.g., enter desired user actions for the game, etc.). Further, the controller may include input devices 156 (FIG. 4) to enter and reset resistance controls and reset clock and other functions, and input device 157 to control function assignment of controller input devices as described below. Devices 156, 157 may be implemented by any conventional or other input devices (e.g., buttons, slides, switches, etc.). The controller lower portion includes a generally "U"-shaped handle or grip 122 for engagement by a user.

Effect bar 110 includes at least one sensor to measure at least one type of strain applied by the user to that bar. Preferably, effect bar 110 includes strain gauge sensors 150, 160 (FIG. 4) that are arranged at suitable locations on the bar near the controller. These sensors measure the amount of strain deformation applied to the bar as a result of the user applying pushing, pulling or lateral forces to the controller handle. By way of example only, sensor 150 may measure force applied to the effect bar along an X-axis (e.g., lateral or left/right forces), while sensor 160 may measure forces applied to the effect bar along a Y-axis (e.g., push/pull or forward/backward forces). Additional effect bars may each include respective strain gauge sensors to measure the amounts of bending strain applied to those bars.

The sensors are connected to a control circuit 200 (FIG. 4) within controller 120 via appropriate wiring, where the controller provides appropriate information to game processor 14. Strain gauge measurements that are received by game processor 14 are processed to display a video game scenario on display 16. The scenario is updated in accordance with strain forces applied to the effect bar by a user. The controller may further be configured to control the level of exertion required by a user for one or more effectors in order to achieve a particular response in the video game scenario. Resistance levels may be input to an exercise processor 154 (FIG. 4) by the user via input devices 156 (e.g., a keypad). Alternatively, or in combination with user input, the resistance levels may be controlled by the exercise processor based upon conditions within the video game scenario, such as changing wind conditions, changing grade of the terrain (e.g., going uphill), etc.

A display 124 is further disposed on the controller upper portion and may display various information to the user (e.g., the degree of force applied to a particular effector bar at any given time, the amount of work performed by the user during a particular exercise session, resistance levels, time or elapsed time, force applied to the various axes (X and Y axes), instantaneous force applied and/or any other exercise or other related information). The display is preferably implemented by a Liquid Crystal Display (LCD), but may be any type of display (e.g., LED, etc.).

An alternative exercise system employing a configurable controller is illustrated in FIG. 3B. Exercise system 100 is substantially similar to the exercise system described above for FIG. 3A, with base 92 secured to a platform 112 to provide a gripping surface for user feet. The platform is substantially rectangular and includes a gripping surface (e.g., rubber or rubber type material, etc.) for user feet and receptacles 114 each disposed toward a corresponding platform corner. The receptacles each engage a corresponding end of a second base member 102 to secure the frame to the platform. Lock mechanisms 308 enable adjustment of effector bar and support height. Controller 120 is substantially similar to the controller described above and includes a slightly modified arrangement of input devices (e.g., joystick 121, buttons, 123, etc.). Controller handle 122 is mounted to the top surface of effector bar 110 to enable user interaction with a video game.

Yet another exercise system is illustrated in FIG. 3C. System 100 is similar to the exercise systems described above and includes a frame 390 mounted to a base platform 301. The base platform is substantially rectangular and includes a gripping surface (e.g., rubber or rubber type material, etc.) for user feet. Frame 390 includes a generally ‘V’-shaped mounting member 304 secured or bolted to a front portion of base platform 301. The mounting member includes a substantially cylindrical effector receptacle 305 and a substantially cylindrical mounting receptacle 307 arranged to form the ‘V’-shaped configuration.

Mounting receptacle 307 receives a generally ‘Y’-shaped mounting member 306. Mounting member 306 includes a substantially cylindrical mounting post 315 and a substantially cylindrical support receptacle 311 arranged to form the ‘Y’-shaped configuration. The mounting post includes dimensions less than those of mounting receptacle 307 for insertion within that receptacle, where the mounting post and receptacle form a telescoping arrangement.

Support 103 is substantially similar to the support described above and includes post 104 and support member 106 attached to the top of the post forming a ‘T’-type configuration. The support member includes a curved configuration to contour a user body and pads 107 to enhance user comfort as described above. Post 104 includes dimensions less than those of the support receptacle for insertion within that receptacle, where the post and support receptacle
form a telescoping arrangement. Lock mechanisms 308 maintain the positions of mounting post 315 and post 104 to enable adjustment of the support distance and height relative to the user, respectively.

[0044] Effector bar 110 is substantially similar to the effector bar described above and includes controller 120. The controller is substantially similar to the controller described above for FIG. 3B and includes handle 122 mounted to the effector bar top surface to enable user interaction with a video game as described above. The effector bar includes dimensions less than those of the effector receptacle for insertion within that receptacle, where the effector bar and receptacle form a telescoping arrangement. Lock mechanism 308 maintains the effector bar position to enable adjustment of the controller height relative to the user.

[0045] In addition, the exercise systems described above may further include exercise devices (e.g., foot pedals, stairs, ski type exercisers, treadmills, cycling, etc.) that provide isokinetic and/or isotonic exercise features in addition to the isometric exercise features provided by the effector bar. These exercise devices are associated with signal sources including sensors (e.g., resistors, strain gauges, potentiometers, etc.) that measure user activity and provide a signal indicating the measurement. The exercise devices may be utilized to provide user information to game processor 14 and enable the user to interact with the game in accordance with exercise performed by the user on the devices as described below.

[0046] An exemplary control circuit for each of the systems described above and depicted in FIGS. 3A-3C is illustrated in FIG. 4. Specifically, control circuitry 200 includes sensors 150, 160 and corresponding amplifiers 152, 162, exercise processor 154, a switching device or matrix 158 and a signal processor 164. A conventional power supply (not shown) provides appropriate power signals to each of the circuit components. The circuit may be powered by a battery and/or any other suitable power source. A power switch (not shown) may further be included to activate the circuit components.

[0047] Sensors 150, 160 are each connected to a respective amplifier 152, 162. The electrical resistance of sensors 150, 160 vary in response to compression and stretching of the effector bar. Amplifiers 152, 162 basically amplify the sensor signals (e.g., in a range compatible with the type of controller employed). The amplified voltage value is sent by each amplifier to exercise processor 154 and switching device 158. Exercise processor 154 may be implemented by any conventional or other processor and typically includes circuitry and/or converts the analog signals from the amplifiers to digital values for processing. Basically, the amplified sensor value represents the force applied by the user, where values toward the range maximum indicate greater applied force. The amplified analog value is digitized or quantized within a range in accordance with the quantity of bits within the converted digital value (e.g., -127 to +127 for eight bits signed, -32,767 to +32,767 for sixteen bits signed, etc.) to indicate the magnitude and/or direction of the applied force. Thus, amplified voltage values toward the range maximum produce digital values toward the maximum values of the quantization ranges.

[0048] The exercise processor receives resistance level and reset controls from the user via input devices 156 as described above, and controls amplifier gain parameters to adjust system resistance in accordance with the user specified controls. In particular, the exercise processor adjusts the gain control of the amplifiers in order to facilitate a resistance level in accordance with user input and/or the video game scenario. The gain control parameter basically controls the amount of gain applied by the amplifier to an amplifier input (or sensor measurement). Since greater amplified values correspond to a greater force, increasing the amplifier gain enables a user to exert less force to achieve a particular amplified force value, thereby effectively lowering the resistance of the system for the user. Conversely, reducing the amplifier gain requires a user to exert greater force to achieve the particular amplified force value, thereby increasing the resistance of the system for the user. The exercise processor further adjusts an amplifier Auto Null parameter to zero or tune the strain gauge sensors.

[0049] The exercise processor is further connected to display 124 to facilitate display of certain exercise or other related information as described above. The exercise processor receives the amplified sensor values and determines various information for display to a user (e.g., the degree of force applied to a particular effector bar at any given time, the amount of work performed by the user during a particular exercise session, resistance levels, time or elapsed time, force applied to the various axes (X and Y axes), instantaneous force applied and/or any other exercise or other related information). In addition, the exercise processor resets various parameters (e.g., resistance, time, work, etc.) in accordance with reset controls received from input devices 156.

[0050] Switching device 158 receives the signals from amplifiers 152, 162 and is coupled to input devices or switch controls 157, joystick 121 and signal processor 164. Switching device 158 is similar to the switching device described above and enables a user to selectively configure controller 120 for game functions as described below. By way of example only, effector bar 110 (FIGS. 3A-3C) serves as a right controller joystick, while joystick 121 serves as the left controller joystick, where the functions of the joysticks with respect to a game may be selectively assigned by a user as described below. However, the effector bar may serve as any joystick or other input device.

[0051] The switching device receives information from amplifiers 152, 162 and is coupled to the inputs of signal processor 164. The switching device basically enables information for controller input devices to be selectively placed on the signal processor inputs corresponding to the desired game functions as described above. In particular, switching device 158 is utilized to selectively exchange game functions between joystick 121 and the effector bar. The switching device includes double pole double throw switches 166, 168 that are respectively associated with X and Y motion axes. By way of example only, switch 166 is associated with an X motion axis (e.g., lateral or right/left forces applied to the effector bar or joystick), while switch 168 is associated with the Y motion axis (e.g., forward/backward forces applied to the effector bar or joystick).

[0052] A series of switching device outputs 170, 172 and 174, 176 (e.g., labeled RX, IX, RY and IY, respectively, as viewed in FIG. 4) are respectively associated with switches 166, 168 and are each coupled to specific inputs of signal
The signal processor inputs are typically mapped to game functions in accordance with the game software executed by game processor 14. Switches 166, 168 basically couple the signals from the desired devices (e.g., effector bar or joystick) to the signal processor inputs corresponding to the desired game functions in accordance with controls from a user entered via input devices or switch controls 157. In particular, switch 166 includes for each corresponding throw switch 180, 182 switch contacts that are coupled to sensor 150 and to the signal source of joystick 121 measuring X axis motion. Throw switch 180 is associated with output 170, while throw switch 182 is associated with output 172. These outputs effectively represent the X axis (e.g., lateral or left/right) motion of controller joysticks. The throw switches are configured in a manner to enable the signal from sensor 150 to be placed on one output and the joystick signal to be placed on the other output in accordance with the user control signals, thereby enabling the user to map the joystick or effector bar to a desired game function.

Similarly, switch 168 includes for each corresponding throw switch 184, 186 switch contacts that are coupled to sensor 160 and to the signal source of joystick 121 measuring Y axis motion. Throw switch 184 is associated with output 174, while throw switch 186 is associated with output 176. These outputs effectively represent the Y axis (e.g., forward/backward) motion of controller joysticks. The throw switches are configured in a manner to enable the signal from sensor 160 to be placed on one output and the joystick signal to be placed on the other output in accordance with the user control signals, thereby enabling the user to map the joystick or effector bar to a desired game function. Thus, the functions of joysticks within a game may be selectively assigned to be performed by joystick 121 and/or the effector bar.

Applications of higher complexity with respect to blending functions may require additional selector switches and various combinations of selector switch settings. For example, the joystick or effector bar may individually perform the functions of two joysticks in accordance with the connections. Further, the exercise systems may include various devices (e.g., foot pedals, stairs, ski type exercisers, treadmills, cycling, etc.) that provide isokinetic and/or isotonic exercise features in addition to the isometric exercise features provided by the effector bar as described above. These exercise devices may similarly be assigned to game functions by the user in substantially the same manner described above. In this case, the signal sources associated with these devices are coupled to switching device 158 to direct the signals associated with the exercise devices to the appropriate inputs of signal processor 164. Switching device 158 may include any desired configuration as described above to accomplish the function assignments for these exercise devices.

The signals from the switching device outputs are transmitted to a respective predetermined memory location within signal processor 164. The signal processor may be implemented by any conventional or other processor and typically includes circuitry and/or converts the analog signals from the switching device to digital values for processing in substantially the same manner described above. The signal processor samples the memory locations at predetermined time intervals (e.g., preferably on the order of ten milliseconds or less) to continuously process and send information to the game processor to update and/or respond to an executing gaming application.

Basically, the signal processor processes and arranges the switching device signals into suitable data packets for transmission to the game processor. The signal processor may process raw digital values in any fashion to account for various calibrations or to properly adjust the values within quantization ranges. The data packets are in a format resembling data input from a standard peripheral device (e.g., game controller, etc.). For example, the processor may construct a data packet that includes the status of all controller input devices (e.g., joystick 121, buttons 123, etc.) and the values of each sensor. By way of example only, the data packet may include header information, X-axis information indicating a corresponding sensor force and joystick measurement along this axis, Y-axis information indicating a corresponding sensor force and joystick measurement along this axis, rudder or steering information, throttle or rate information and additional information relating to the status of input devices (e.g., buttons, etc.). Additional packet locations may be associated with data received from controller or other input and/or exercise devices coupled with the signal processor, where the input devices may represent additional operational criteria for the scenario (e.g., the firing of a weapon in the scenario when the user presses an input button, throttle, etc.). The game processor processes the information or data packets in substantially the same manner as that for information received from a conventional peripheral (e.g., game controller, etc.) to update and/or respond to an executing gaming application (e.g., game, etc.).

Each of the exercise systems 100 described above may serve as a game controller that is operable with a wide variety of video gaming systems including, without limitation, PS2, XBOX and GAMECUBE systems, as well as different personal computers (e.g., personal computers with MICROSOFT WINDOWS and Apple Mac OS X operating systems). In particular, in each of the systems 100 described above, a single cable system is provided, in accordance with the present invention, that facilitates connection and communication between controller 120 and multiple (e.g., two or more) video gaming systems.

An exemplary embodiment of a cable system that facilitates multiple connections with different video gaming systems according to the present invention is depicted in FIGS. 5 and 6. Referring to FIG. 5, a cable system 220 is connected to and extends from a rear surface of controller 120 (i.e., a controller surface that opposes the controller surface including joystick 121, buttons 123 and display 124) and at a location above controller handle 122. Cable system 220 includes a flexible and hollow cable 224 that extends into controller 120 via an access panel or door 222 to receive and retain wiring that is connected with the signal processor within the controller. Alternatively, it is noted that the cable may connect with the controller at any other suitable location and/or in any other suitable manner. A number of separately and independently extending wires are sheathed within and extend the length of cable 224. The wires within cable 224 are configured for providing an electrical contact or link between the signal processor of controller 120 and a specific video gaming system as described below.
ing 230 along a first surface of the housing. A number of flexible and hollow cables 232-1, 232-2, 232-3, 232-4 extend from housing 230 along a second surface of the housing that opposes the first housing surface. The wiring within cable 224 extends within housing 230 for transfer of signals to wiring sets directed into and through a respective one of cables 232-1 to 232-4. Thus, housing 230 serves as a junction location for the transfer of signals between wiring within cable 224 and respective wiring sets of cable 232, where each cable 232 includes a wiring set that is configured for connection to a game controller port of a different video gaming system.

[0060] Depending upon the types of different gaming systems in which the cable system of the present invention is configured for use, the different types of gaming systems may communicate the same or common signals with a controller. Accordingly, some of the wires for two or more different wiring sets of cable 232 may convey common signals and thus the wires transferring the common signals may be coupled to the same wire within cable 224 of the cable system. In particular, the cable system may be designed such that one or more of the wires within cable 224 convey signals that are shared between two or more wiring sets (e.g., signals common to two or more gaming systems). Each wire with shared signals is coupled within housing 230 to wires within the appropriate wiring sets of two or more of the cables 232-1 to 232-4 to transfer the signals. The sharing of common signals reduces the number of wires within cable 224 for a particular configuration since a cable wire with shared signals may accommodate a plurality of wiring sets wires, thereby obviating the need for a dedicated cable wire for each wiring set wire.

[0061] Each cable 232 terminates in a respective connection plug 240-1 to 240-4, where each connection plug is different from the others and is configured to connect with a corresponding game controller port of a respective video gaming system. The connection plugs connect with the game controller ports in a male-female mating relationship, where each connection plug 240 includes a male component with associated metal pins and/or other metal contacting structure that is configured for insertion into a corresponding female component of a respective controller port to establish an electrical contact between the wiring set associated with the connection plug and corresponding wiring that connects in a suitable manner with the game processor of the video gaming system. In the exemplary embodiment of FIG. 5, connection plug 240-1 is configured to connect with a game controller port of a GAMECUBE system, connection plug 240-2 is configured to connect with a game controller port of an XBOX system, connection plug 240-3 is configured to connect with a game controller port of a PS2 system, and connection plug 240-4 is configured to connect with a universal serial bus (USB) port of any other suitable gaming system, such as a personal computer (e.g., to facilitate gaming control of Microsoft WINDOWS or Apple MAC OS X based gaming applications). However, the cable system of the present invention is not limited to this exemplary configuration, but rather can include any suitable number (e.g., two or more) of connection plugs of any suitable types and configurations to facilitate connections with any types of video gaming systems.

[0062] Each of the cables 232-1 to 232-4 further includes a generally cylindrical ferrite core 250 through which the cable extends, where each ferrite core 250 is disposed proximate a corresponding connection plug 240-1 to 240-4. The ferrite cores suppress radiation and further attenuate electrical signals conveyed through the cables of the cable system in a conventional manner.

[0063] Cable 224 is of a suitable length (e.g., eight feet or greater) to facilitate a relatively easy connection between exercise system 100 and a video gaming system via cable system 220. In situations where the exercise system is located a considerable distance (e.g., greater than eight feet) from a video gaming system, the cable system can be configured to include an extension cable device 300 to provide a hard wired connection between controller 120 of system 100 and a video gaming system 400 (e.g., including game processor 14 (FIG. 4)). The exercise system depicted in FIG. 6 is substantially similar to the system described above and depicted in FIG. 3C. However, the cable system can be utilized with any of the other systems described above. In particular, extension cable device 300 includes a flexible and hollow cable 302 that extends a suitable length (e.g., about 8 feet or greater) and connects with a first housing 316 at a first end of the cable and further connects with a second housing 330 at a second end of the cable. Cable 302 is substantially similar in configuration and design as cable 224 of cable system 220, where the same or substantially similar wiring extends through the cable. Further, cable 302 can include one or more wires that transfer common or shared signals for two or more wiring sets as described above.

[0064] Each housing 316, 330 is substantially similar in configuration and design as housing 230 of cable system 220, where each housing serves as a junction location to transfer signals between the wiring within cable 302 and each wiring set in a similar manner as described above for housing 230 so as to direct each wiring set through a respective cable that connects with a respective connection plug. In particular, at a first end of the extension cable device, a number of flexible and hollow cables 310-1, 310-2, 310-3, 310-4 extend from housing 316 along a surface of the housing that opposes the housing surface to which cable 302 connects with the housing. Each cable 310 couples a respective wiring set therein to housing 316 and terminates at a respective connection plug 312-1, 312-2, 312-3, 312-4. The housing transfers signals between the wiring sets and the appropriate wiring in cable 302, where one or more of the wires of cable 302 may convey signals common to the gaming systems to reduce the quantity of wires employed by the cable as described above. Each connection plug 312-1, 312-2, 312-3, 312-4 is complimentary with and configured for connection to a corresponding connection plug 232-1, 232-2, 232-3, 232-4 of cable system 220. In addition, the wiring sets disposed within the connection plugs 312 of extension cable device 300 include the same or substantially similar wiring as the wiring sets disposed within the corresponding connection plugs 232 of cable system 220. In the embodiment depicted in FIG. 6, the connection plugs 232 and 312 connect with each other in a male-female mating relationship, where a male component of each connection plug 232 is inserted into a female component of a corresponding connection plug 312 to achieve an electrical contact between metal elements (e.g., pins and corresponding
receiving receptacles and/or other metal complimentary contacting structures) of the plugs 232 and 312, which also facilitates an electrical connection between the corresponding pairs of wiring sets extending within the cable system and the extension cable device. However, any other suitable connection between the connection plugs can be provided to facilitate electrical contact between corresponding pairs of wiring sets.

[0065] At a second end of the extension cable device, a number of flexible and hollow cables 332-1, 332-2, 332-3, 332-4 extend from housing 330 along a surface of the housing that opposes the surface to which cable 302 connects with the housing. Each cable 332 couples a respective wiring set therein to housing 330 and terminates at a respective connection plug 340-1, 340-2, 340-3, 340-4 of extension cable device 300. The housing transfers signals between the wiring sets and the appropriate wiring in cable 302, where one or more of the wires of cable 302 may convey signals common to the gaming systems to reduce the quantity of wires employed by cable 302 as described above. Each connection plug 340-1, 340-2, 340-3, 340-4 is identical in configuration and design as a corresponding connection plug 232-1, 232-2, 232-3, 232-4 of cable system 220. Thus, each of the connection plugs 340 at the second end of the extension cable device includes a female component with associated metal pins and/or other metal contacting structure that is configured for insertion into a corresponding component of a respective controller port to establish an electrical contact between the wiring set associated with the connection plug and corresponding wiring of the exercise system to which the connection plug is connected.

[0066] The sets of wiring that are directed to each connection plug 340 at the second end of the extension cable device are further the same or substantially similar as the wiring sets of a corresponding connection plug 232 of cable system 220. Thus, the mapping of wiring sets through cable system 220 to the various connection plugs is maintained by extension cable device 300 so as to facilitate an extension of the various wiring sets a suitable distance for providing communication between controller 120 and video gaming system 400. In addition, it is noted that extension cable device 300 can also be utilized with any video gaming system and corresponding game controller that include connecting components that correspond with any of the connection plug sets 312, 340 that are provided on the extension cable device. Thus, the extension cable device of the present invention serves as a universal extension cable for a variety of different connection plug/port designs that exist for different video gaming systems and game controllers.

[0067] Only a single set of wires need be connected between control unit 120 and a video gaming system to facilitate an exchange of electrical signals and communication between the control unit and the video gaming system. In the exemplary embodiment depicted in FIG. 6, the control unit 120 is connected with a video gaming system 400 (e.g., a GAMECUBE system) via connection plugs 232-1, 312-1 and 340-1 of cable system 220 and extension cable device 300, while the remaining connection plugs 232, 312 and 340 remain free (i.e., are not connected to any corresponding plug or port). Depending upon the distance separating the exercise system from the video gaming system, connection between these two components can be achieved through direct connection of connection plug 232-1 with the corresponding game controller port of the video gaming system, thus eliminating the need for the extension cable device. In this configuration, exercise control system 100 is enabled as a game controller for video gaming applications being executed by video gaming system 400.

[0068] Signal processor 164 of control circuit 200 of the exercise system is configured for effective communication and operability as a game controller with each of the video gaming systems associated with the different wiring sets and cable connectors that are provided for the cable system. In particular, when cable system 220 (optionally including the extension cable device 300) is connected with a video gaming system in the manner described above and depicted in FIG. 6, signal processor 164 identifies the specific video gaming system with which control unit 120 is connected upon receiving one or more initial electrical signals (e.g., one or more “wake-up” signals) from the video gaming system. When the specific video gaming system is identified, the signal processor processes and arranges signals into suitable data packets as described above for transmission to and recognition by the video gaming system during a gaming application.

[0069] Operation of exercise system 100 is described with reference to FIG. 6. Initially, the user couples the system to a video gaming system 400 utilizing the appropriate connection plug or plugs of cable system 220 and/or extension cable device 300. Based upon the video gaming system utilized and/or the particular gaming application that is to be executed, the user selectively assigns game functions to the joystick, the effector bar and/or other input and/or exercise devices as described above. The user may adjust the exercise system (e.g., controller height, support height and distance, etc.) to accommodate the user's physical characteristics.

[0070] During an initial set-up sequence (e.g., when the video gaming system is powered on), signal processor 164 (FIG. 4) of controller 120 receives one or more initial signals from video gaming system 400, such that the signal processor identifies the specific video gaming system and arranges signals in suitable data packets for recognition by the identified system. A game is selected and executed on the gaming system, and the user engages in an exercise to interact with the game. The user operates the system with the user lower body portion (e.g., buttocks) supported by support 103, the user feet engaging base platform 301 and the user hands placed on controller handle 122. The user grips the controller handle and applies a force to the controller to exert a strain on the effector bar. The user applies one or more forces to the controller and, hence, the effector bar with respect to at least one of the X and Y axes so as to effect corresponding movement, for example, of a character or an object in the scenario displayed by the game processor. The user may further manipulate joystick 121, other controller input devices and/or other exercise devices for additional actions depending upon the particular game and user function assignments.

[0071] The signals from the strain gauge sensors and input and/or exercise devices (e.g., joystick, buttons, stair climbing, cycling, pedals, etc.) are transmitted to signal processor 164 (FIG. 4) via switching device 158 as described above. The signal processor generates the data packets for trans-
ference to video gaming system 400. The gaming system processes the information or data packets in substantially the same manner as that for information received from a conventional peripheral (e.g., game controller, etc.) to update and/or respond to an executing gaming application. Thus, the force applied by the user to the effector bar results in a corresponding coordinate movement or action in the scenario displayed on a display 16 in accordance with the function assigned to the bar by the user. In other words, user exercise serves to indicate desired user actions or movements to the game processor to update movement or actions of characters or objects within the game in accordance with the function assigned to the bar or another exercise device by the user. For example, when the user assigns the effector bar accelerator and steering functions, application of a forward force to the controller may serve as the accelerator, while lateral force applied to the controller may serve as the steering function.

[0072] As noted above, a single signal processor is implemented in the control circuit of the game controllers described above, where the signal processor is capable of communicating with a number of different video gaming systems in the manner described above. However, the present invention is not limited to the use of a single processor. Rather, the system may include multiple processors (e.g., two or more), where each processor is configured to enable communication of signals between the game controller (e.g., any of the exercise systems as described above) and at least one corresponding video gaming system. In addition, the electrical connection and/or communication between the one or more signal processors of the game controller systems are not limited to the cable system and extension cable device described above. Rather, any suitable wired and/or wireless communication links can be provided that facilitate communication between one or more processors of the game controllers of the present invention and two or more different video gaming systems.

[0073] A controller including one or more processors connected to different video gaming systems in accordance with the present invention is illustrated in FIG. 7. Specifically, controller unit 120, which is similar to the controllers described above for FIGS. 3A-3C, 5 and 6, includes any number of suitable processors 500-1, . . . , 500-n (e.g., one processor or multiple processors). Communication between the one or more processors of the controller and the different video gaming systems is achieved via a communication link 510 coupling the processors to a selected number of connection plugs 440-1 to 440-n. The communication link 510 can include wired cable connections and/or one or more suitable wireless connections. Each connection plug 440-1 to 440-n is further configured to engage with a game controller port of a respective video gaming system 400-1 to 400-n (e.g., in a male-female engaging manner such as described above for the connection plugs of the cable system and the extension cable device).

[0074] In one embodiment, the communication link 510 includes wired cables similar to cable system 220 and/or extension cable device 300 as described above and depicted in FIGS. 5 and 6. In this embodiment, one or more processors 500 may be employed. For instance, controller 120 may include a single processor 500 configured to communicate with a selected number of different video gaming systems 400-1-400-n (as in the system described above and depicted in FIGS. 5 and 6). Alternatively, the controller may include a selected number of processors 500-1-500-n, where each processor is a dedicated processor configured to communicate with one specific video gaming system. Each dedicated processor of the controller may be activated based upon receiving one or more initial signals (e.g., “wake up” signals) from a respective video gaming system to which the controller is attached in a similar manner as described above.

[0075] In another embodiment, the communication link includes wireless connections, such as transmitters, receivers and/or transceivers configured to communicate with each other via any suitable signals (e.g., radio frequency or RF, infrared or IR, etc.) so as to eliminate cable connections between the game controller and the video gaming system. For example, controller 120 may include a single processor 500 and a transceiver to communicate, via communication link 510 with a series of connection plugs 440-1 to 440-n that are configured for connection with the game controller ports of a series of different video gaming systems 400-1 to 400-n. Each connection plug 440 similarly includes or is connected (via suitable wiring) to a transceiver for communication. Each connection plug 440 may be connected to its own dedicated transceiver, such that each connection plug is a separate component and thus not integral with other connection plugs. Alternatively, a single transceiver may be connected to a number (e.g., two or more) of different connection plugs to thereby integrate a series of connection plugs into a single component that facilitates communication between the game controller and a number of different video gaming systems. Thus, processor 500 is capable of separately and independently communicating with each video gaming system 400, via wireless transmissions between the transceiver connected to the processor and the dedicated transceiver connected to a respective connection plug 440, where the respective connection plug is connected to the game controller port of a respective video gaming system 400.

[0076] In another example, controller 120 may include multiple processors 500-1-500-n coupled to one or more transceivers to communicate, via communication link 510, with one or more transceivers connected (via suitable wiring) to connection plugs 440. The controller may be configured such that each processor 500 communicates with a respective video gaming system, via wireless transmissions between a transceiver connected with the processor and a transceiver connected with a respective connection plug 440, where the respective connection plug is connected with a game controller port of the video gaming system. As in the previous example, a single transceiver can be connected to either or both of the multiple processors 500-1-500-n and the multiple connection plugs 440-1-440-n. Alternatively, either or both of sets of processors 500-1-500-n and connection plugs 440-1-440-n may be configured such that each processor and/or connection plug includes its own dedicated transceiver.

[0077] In yet another example, a single transceiver coupled to a number of different connection plugs 440 may be employed to communicate via communication link 510 with one or more transceivers connected to one or more processors 500 in controller 120. In this example, the transceiver connected with the connection plugs further includes a signal processor that determines a specific video
gaming system to which it is attached in a similar manner as described above for the signal processor of the controller (e.g., by receiving an initial one or more signals from the video gaming system that identifies the video gaming system to the signal processor within the transceiver). The signal processor within the transceiver then receives, via wireless transmissions, data packets from a processor of the game controller and converts the data packets into an appropriate format that is recognizable by the video gaming system to which the connection plug X is connected. Thus, in this embodiment, a signal processor of the transceiver link, rather than the signal processor of the game controller, performs the function of identifying the video gaming system to which it is connected and converts data as appropriate to facilitate communications between the game controller and the video gaming system.

[0078] It will be appreciated that the embodiments described above and illustrated in the drawings represent only a few of the many ways of implementing a game controller connection system and method of selectively connecting a game controller with a plurality of different video gaming systems.

[0079] The controllers may be of any shape or size, may be constructed of any suitable materials, and may be of the type of any commercially available or other game controller (e.g., those for use with PS2, XBOX, GAMECUBE, Microsoft WINDOWS or Mac operating systems, etc.). The controllers may include any quantity of any types of input devices (e.g., buttons, slides, joysticks, track type balls, etc.) disposed at any locations and arranged in any fashion. The controllers may include any quantity of any types of signal source devices to generate signals in accordance with input device manipulation (e.g., variable resistors or potentiometers, switches, contacts, relays, sensors, etc.). The signal sources may correspond with any quantity of motion axes for an input device. Any controller input devices may be assigned to any suitable game functions by the switching device. Alternatively, the game controller and/or exercise device may include fixed functional assignments for the input devices.

[0080] The switching matrix or devices may be implemented by any quantity of any conventional or other devices capable of switching signals (e.g., switches, multiplexers, cross-bar switch, analog switches, digital switches, routers, logic, gate arrays, logic arrays, etc.). The switching controls or switch control unit may be implemented by any conventional or other control or input devices (e.g., processor, slides, switches, buttons, etc.). The control processor may be implemented by any conventional or other processor or circuitry (e.g., microprocessor, controller, etc.). The switching devices may direct signals from any quantity of inputs to any quantity of outputs in accordance with user-specified or other controls and may map any controller input devices and/or exercise devices to any suitable game functions. The switching device may be disposed internal or external of the controllers.

[0081] The game processor or gaming system may be implemented by any quantity of any personal or other type of computer or processing system (e.g., IBM-compatible, Apple, Macintosh, laptop, palm pilot, microprocessor, gaming consoles such as the Xbox system from Microsoft Corporation, the PlayStation 2 system from Sony Corporation, the GameCube system from Nintendo of America, Inc., etc.). The game processor or gaming system may be a dedicated processor or a general purpose computer system (e.g., personal computer, etc.) with any commercially available operating system (e.g., Windows, Unix, Linux, etc.) and/or commercially available and/or custom software (e.g., communications software, application software, etc.) and any types of input devices (e.g., keyboard, mouse, microphone, etc.). The game processor or gaming system may execute software from a recorded medium (e.g., hard disk, memory device, CD, DVD or other disks, etc.) or from a network or other connection (e.g., from the Internet or other network).

[0082] The exercise systems and components (e.g., frames, effectors, extenders, connectors, bases, base members, supports, grips, platforms, mounting members, posts, receptacles, pads, etc.) may be of any size or shape, may be arranged in any fashion and may be constructed of any suitable materials. The effectors may be constructed of any suitable materials that preferably are subject to measurable deflection within an elastic limit of the materials when subjected to one or more straining or other forces by the user. The effectors may have any suitable geometric configurations, and two or more effectors may be combined in any suitable manner to yield a system frame that conforms to a desired design for a user for a particular application. Any suitable number of any types of sensors (e.g., strain gauges, etc.) may be applied to an effector to facilitate the measurement of any one or more types of strain or other forces applied by the user (e.g., bending forces, twisting forces, compression forces and/or tension forces). Each of the exercise systems may be adjustable in any fashion (e.g., any dimension, controller and/or support height, controller and/or support orientation or distance to the user, etc.) via any types of arrangements of components (e.g., telescoping arrangement, overlapping arrangement, extender components, etc.) to accommodate user physical characteristics. The locking mechanisms may include any type of locking device (e.g., friction device, clamp, peg and hole arrangement, etc.) to releasably maintain an exercise system component in a desired position or orientation to accommodate a user.

[0083] Any suitable connector may be utilized to connect any two or more effectors together, including, without limitation, lug nuts, couplings, tee fittings, yoke fittings and cross fittings. Any number of connectors may be utilized to form a system frame of effectors. The connectors may be constructed of any suitable materials. The frame may include any quantity of any type of seat or other user support structure disposed at any locations to support a user or user body portions.

[0084] Any suitable number of any types of sensors may be disposed at any locations and be utilized to measure any type of strain or other force applied to any suitable number of effectors or to measure any types of user exercise. The sensors may be constructed of any suitable materials, may be disposed at any system locations and may be of any suitable type (e.g., strain gauge, potentiometer, etc.). Further, the sensors may include any electrical, mechanical or chemical properties that vary in a measurable manner in response to applied force or other motion to measure exercise performed by the user. The handle of the exercise system controller may be of any shape or size and disposed at any location to
receive force applied by a user. Alternatively, the user may apply force directly to the effector bar. The effector bars and/or exercise devices may be assigned the gaming functions of any desired controller input devices.

[0085] The processors (e.g., control, exercise, signal, game, switching devices, etc.) may be implemented by any quantity of any type of microprocessor, processing system or other circuitry, while the control circuitry may be disposed at any suitable locations on the systems, within the controller or, alternatively, remote from the systems.

[0086] Any suitable number of signal processors (e.g., one or more) may be provided within the game controller and/or communication receiving devices to facilitate effective communication between the game controllers and the video gaming systems. The signal processors may arrange digital data (e.g., force or other measurements by sensors, controller information, etc.) into any suitable data packet format that is recognizable by the game processor or host computer system receiving data packets from the signal processors. The data packets may be of any desired length, include any desired information, and be arranged in any desired format.

[0087] The signal processors may sample the information at any desired sampling rate (e.g., seconds, milliseconds, microseconds, etc.), or receive measurement values or other information in response to interrupts. The analog values may be converted to a digital value having any desired quantity of bits or resolution. The processors (e.g., control, signal, exercise, etc.) may process raw digital values in any desired fashion to produce information for transmission to the display, game processor or host computer system. This information is typically dependent upon a particular application. The correlation between the measured force or exercise motion and provided value for that force or motion may be determined in any desired fashion. By way of example, the amplified measurement range may be divided into units corresponding to the resolution of the digital value. For an eight bit unsigned digital value (e.g., where the value indicates the magnitude of force), each increment represents 1/256 of the voltage range. With respect to a five volt range, each increment is 1/256 of a volt, which is approximately 0.02 volts. Thus, for an amplified force measurement of three volts, the digital value may correspond to approximately 150 (i.e., 3/0.02).

[0088] Any suitable number of any types of conventional or other circuitry may be utilized to implement the control circuit, amplifiers, sensors, switching device and processors (e.g., exercise, control, signal, etc.). The amplifiers may produce an amplified value in any desired voltage range, while the A/D conversion may produce a digitized value having any desired resolution or quantity of bits (e.g., signed or unsigned). The control circuit may include any quantity of the above or other components arranged in any fashion. The resistance change of the sensors may be determined in any manner via any suitable conventional or other circuitry. The amplifiers and processors (e.g., exercise, signal, etc.) may be separate within a circuit or integrated as a single unit. Any suitable number of any type of conventional or other displays may be connected to the processors (e.g., exercise, signal, control, game, etc.) to provide any type of information relating to a particular computer interactive exercise session (e.g., results from isometric exercises including force and work, results from motion exercise including speed and distance traveled, calories burned, etc.). A display may be located at any suitable location on or remote from the exercise systems.

[0089] The control circuitry and/or signal processors of the game controllers may be connected to one or more game processors of video gaming or host computer systems via any suitable peripheral, communications media or other port of those systems. Any suitable number and types of wired and/or wireless devices may be provided to facilitate communications between game controllers and video gaming systems. For example, any suitable number of cables can be provided and configured for connection with each other, with each cable including one or more suitable wiring sets with one or more wires, to facilitate connection with two or more video gaming systems. The cable junctions of the cable system and extension cable device may transfer signals between the wires within the cable and wiring sets in any fashion (e.g., direct connection of wires, connection to a terminal, etc.). The wiring of the cable may be connected to any quantity of wiring sets, where the cable wiring may utilize one or more wires to transfer gaming signals common to any quantity of wiring set wires to reduce the quantity of wires employed in the cable. Alternatively, the cable may include a dedicated wire for each wiring set wire. Any suitable number and types of housings or other structures may be connected with one or more cables to facilitate transfer of signals between wiring extending within a cable and wiring sets for transfer into separate cables. Any suitable number and types of connectors (e.g., male and/or female connection plugs) may be provided to facilitate connection and a communication link between a game controller and one or more different video gaming systems. The cable system and extension cable device may include cables of any suitable lengths. The wake-up signal may include any signal or desired information to identify a gaming system (e.g., voltage or current level, gaming system identifier, etc.).

[0090] Any suitable number and types of wireless communication links (e.g., transmitters, receivers and/or transceivers) that send and/or receive any suitable types of signals (e.g., RF and/or IR) can be provided for connection with a game controller and/or one or more video gaming systems. One or more signal processors may be connected with one or more wireless communication links to facilitate communications between a game controller and one or more video gaming systems. In addition, one or more signal processors may be provided within a communication device (e.g., a transceiver), connection plugs and/or other connecting structure that connects with one or more video gaming systems, where the signal processors are configured to identify video gaming systems to which they are connected as well as convert data transmissions for recognition by a game controller and/or a video gaming system that are linked to each other.

[0091] Further, a universal adaptor may be provided that is generic and configured to connect with any selected types of game controllers and video gaming systems, where the universal adaptor includes one or more suitable signal processors to identify a specific video gaming system and to effectively convert data transmissions for recognition by each of the game controller and the specific video gaming system that is connected to the game controller via the universal adaptor. The universal adaptor may include one or
more cables to sheath one or more sets of wiring and/or one or more suitable wireless communication devices (e.g., transmitters, receivers and/or transceivers) to facilitate wireless communications.

[0092] Any suitable number of additional input devices may be provided for the system to enhance video game scenarios. The input devices of the exercise devices may be provided on any suitable number of control panels that are accessible by the user during system operation and have any suitable configuration (e.g., buttons, switches, keypads, etc.). Optionally, the input devices of the exercise devices (e.g., foot pedals, stairs, ski type exercisers, treadmills, etc.) may provide any isokinetic and/or isotonic exercise features in addition to or instead of the isometric exercise features provided by effectors. The exercise devices may be assigned to any desired game functions in the manner described above and may further be resistance controlled by the exercise processor, where control signals may be transmitted to a resistance or braking device or the amount of effort required by the user may be modified.

[0093] The resistance level for the effector bar and other exercise devices may be controlled by adjusting amplifier or other parameters. Alternatively, the resistance level may be controlled based on thresholds entered by a user. For example, the processors (e.g., exercise and/or signal processors) may be configured to require a threshold resistance level to be achieved, which is proportionate to the amount of straining force applied by the user to one or more effectors or to an amount of motion or force applied to an exercise device (e.g., rate of stair climbing or pedaling, etc.) before assigning appropriate data values to the data packets to be sent to the game processor or host computer. Threshold values for the change in resistance may be input to the processor by the user via an appropriate input device (e.g., a keypad).

[0094] It is to be understood that the software of the exercise systems and/or processors (e.g., control, exercise, game, signal, switching devices, etc.) may be implemented in any desired computer language, and could be developed by one of ordinary skill in the computer and/or programming arts based on the functional description contained herein. Further, any references herein of software performing various functions generally refer to computer systems or processors performing those functions under software control. The processors (e.g., control, exercise, signal, switching device, etc.) may alternatively be implemented by hardware or other processing circuitry, or may be implemented on the game processor or host system as software and/or hardware modules receiving the sensor and/or input device information or signals. The various functions of the processors (e.g., control, exercise, signal, game, switching devices, etc.) may be distributed in any manner among any quantity (e.g., one or more) of hardware and/or software modules or units, processors, computer or processing systems or circuitry, where the processors, computer or processing systems or circuitry may be disposed locally or remotely of each other and communicate via any suitable communications medium (e.g., LAN, WAN, Intrarnet, Internet, hardwire, modem connection, wireless, etc.). The software and/or algorithms described above may be modified in any manner that accomplishes the functions described herein.

[0095] The terms “upward”, “downward”, “top”, “bottom”, “side”, “front”, “rear”, “upper”, “lower”, “vertical”, “horizontal”, “height”, “width”, “length”, “forward”, “backward”, “left”, “right” and the like are used herein merely to describe points of reference and do not limit the present invention to any specific orientation or configuration.

[0096] The present invention controller is not limited to the gaming applications described above, but may be utilized as a configurable peripheral for any processing system, software or application.

[0097] Having described preferred embodiments of a new and improved game controller connection system and method of selectively connecting a game controller with a plurality of different video gaming systems, variations and changes will be suggested to those skilled in the art in view of the teachings set forth herein. It is therefore to be understood that all such variations, modifications and changes are believed to fall within the scope of the present invention as defined by the appended claims.

1. A game controller to interact with a plurality of different game processors including different gaming applications, comprising:
   a plurality of user-manipulable input devices, wherein at least one of the user-manipulable input devices provides an isometric exercise for a user;
   at least one signal processor to receive and process signals associated with manipulations of the user-manipulable input devices and to communicate with a plurality of different game processors; and
   a communication link to transfer signals between the at least one signal processor and a selected game processor, wherein said communication link comprises a plurality of connection plugs with at least two of the connection plugs being configured to connect with different game processors.

2. The game controller of claim 1, wherein the communication link further comprises:
   a first cable including wiring extending within the first cable and connected to the at least one signal processor; and
   a plurality of interface cables disposed proximate an end of the first cable, each interface cable including a respective wiring set transferring signals with the first cable and extending within the interface cable;
   wherein each connection plug is connected to a respective interface cable.

3. The game controller of claim 2, wherein the communication link further comprises a housing to receive the wiring from the end of the first cable and transfer signals to a respective interface cable.

4. The game controller of claim 2, wherein the communication link further comprises an extension cable device including:
   a second cable including wiring extending within the second cable;
   a plurality of controller cables disposed proximate a first end of the second cable, each controller cable including a respective wiring set transferring signals with the first end of the second cable and extending within the
controller cable and further including a connection plug that connects with a respective connection plug of the interface cable; and

a plurality of processor cables disposed proximate a second end of the second cable, each processor cable including a respective wiring set transferring signals with the second end of the second cable and extending within the processor cable and further including a connection plug that connects with a respective game processor to transfer signals between the communication link connected with the at least one signal processor and the respective game processor.

5. The game controller of claim 1, wherein the communication link includes at least one wireless communication link to transfer communication signals between the signal processor and the selected game processor.

6. The game controller of claim 5, wherein each connection plug is coupled to a corresponding transceiver.

7. The game controller of claim 5, wherein a plurality of connection plugs is connected to a transceiver.

8. The game controller of claim 7, wherein said transceiver coupled to said plurality of connection plugs includes a processor to receive signals from the signal processor and transfer signals to the selected game processor in a format compatible with the game processor to control gaming application functions.

9. The game controller of claim 1, wherein the at least one signal processor includes a plurality of signal processors with each signal processor configured to communicate with a corresponding game processor.

10. The game controller of claim 1, wherein the game controller is disposed within an exercise system, and at least one of the user-manipulable input devices comprises an effector bar to provide an isometric exercise for the user.

11. The game controller of claim 1, wherein the plurality of connection plugs includes at least three connection plugs each configured to connect with a different game processor.

12. The game controller of claim 1, wherein at least one connection plug is configured to connect a part of a personal computer.

13. A method of connecting a game controller to a plurality of different game processors, the game controller including a plurality of user-manipulable input devices, at least one processor to receive and process signals associated with manipulations of the user-manipulable input devices, and a communication link to transfer signals between the game controller and plurality of game processors and including at least a first connection plug and a second connection plug, the first and second connection plugs being configured to connect with different game processors, the method comprising:

(a) selecting a game processor and engaging a corresponding connection plug of the communication link with a port of the selected game processor to transfer signals between the at least one signal processor and the selected game processor via the communication link;

(b) identifying the selected game processor, via the at least one signal processor, in response to receiving at least one initial signal from the selected game processor via the communication link;

(c) receiving and processing signals associated with manipulations of the user-manipulable input devices via the at least one signal processor, wherein at least one user-manipulable input device provides an isometric exercise for a user; and

(d) transferring signals, via the communication link, from the at least one signal processor to the selected game processor in a format compatible with the selected game processor to control gaming application functions.

14. The method of claim 13, wherein the communication link includes a cable.

15. The method of claim 13, wherein the communication link includes at least one wireless communication link.

16. The method of claim 13, wherein the game controller is disposed within an exercise system, and at least one of the user-manipulable input devices comprises an effector bar to provide an isometric exercise for the user, and step (c) includes:

(c.1) receiving and processing signals associated with manipulations of the effector bar via the at least one signal processor.

17. A connector for transferring signals between a game controller and a plurality of different game processors, the connector comprising:

a communication link to transfer signals between the game controller and a selected game processor, wherein the communication link is selectively coupled to the game controller and comprises a plurality of connection plugs with at least two of the connection plugs being configured to connect with different game processors.

18. The connector of claim 17, wherein the communication link further comprises:

a first cable including wiring extending within the first cable and coupled to the at least one signal processor; and

a plurality of interface cables extending proximate a first end of the first cable, wherein each interface cable includes a corresponding connection plug and a respective wiring set transferring signals with the first end of the first cable and extending within the interface cable to the corresponding connection plug.

19. The connector of claim 17, wherein the communication link further comprises:

a first cable including wiring extending within the first cable;

a plurality of interface cables extending proximate a first end of the first cable, wherein each interface cable includes a corresponding connection plug to couple the interface cable to the game controller and a respective wiring set transferring signals with the first end of the first cable and extending within the interface cable to the corresponding connection plug; and

a plurality of processor cables extending proximate a second end of the first cable, wherein each processor cable includes a corresponding connection plug configured to connect with a respective game processor and a respective wiring set transferring signals with the second end of the first cable and extending within the processor cable to the corresponding connection plug.
20. The connector of claim 17, wherein the communication link includes at least one wireless communication link.

21. The connector of claim 20, wherein a wireless communication link includes a transceiver coupled to the plurality of connection plugs.

22. The connector of claim 21, wherein the transceiver coupled to the plurality of connection plugs includes a processor to receive signals from the signal processor and transfer signals to a selected game processor in a format compatible with the selected game processor to control gaming application functions.

23. The connector of claim 17, wherein the plurality of connection plugs includes at least three connection plugs each configured to connect with a different game processor.

24. The connector of claim 17, wherein at least one connection plug is configured to connect a port of a personal computer.

25. The game controller of claim 1, wherein at least one of the connection plugs is configured to connect with a USB port.

26. The method of claim 13, wherein at least one of the first and second connection plugs is configured to connect with a USB port.

27. The connector of claim 17, wherein at least one of the connection plugs is configured to connect with a USB port.

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