DISTINGUISHING MULTIPLE PERIPHERALS IN WAGERING GAME

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Apparatus, systems, and methods may operate to physically locate substantially similar or identical universal serial bus (USB) peripherals by receiving matching identification information from a plurality of USB peripherals coupled to a wagering game machine, and associating each one of the USB peripherals having the matching identification information with a corresponding predetermined physical location. Association may occur via automated reading of location indication devices, such as USB hubs having location-specific coupled to the USB peripherals. Other apparatus, systems, and methods are disclosed.
FIG. 2

CASINO

WIRELESS ACCESS POINT

LID

WAGERING GAME SERVER

COMMUNICATIONS NETWORK

CASINO

CASINO

200

210

210

210

210

210

202

202

202

202

202

202

202

208

206

212

212

216
RAM CLEAR

RECEIVE MATCHING INFORMATION

* PRESENT QUERY
* RECEIVE INFORMATION IN RESPONSE TO QUERY

* RECEIVE INFORMATION FROM LOCATION INDICATION DEVICE

COMMUNICATE WITH USB HUB(S)

MODIFY INFORMATION

POWER SEQUENCE?

YES

APPLY POWER SIGNALS

ASSOCIATE PERIPHERALS WITH PHYSICAL LOCATION

NO

APPLY ENABLE SIGNALS

FIG. 3
DISTINGUISHING MULTIPLE PERIPHERALS IN WAGERING GAME

RELATED APPLICATION

[0001] This patent application claims the priority benefit of U.S. Provisional Patent Application Ser. No. 60/986,636 filed Nov. 9, 2007, and entitled "DISTINGUISHING MULTIPLE PERIPHERALS IN WAGERING GAME MACHINES," which application is incorporated herein by reference in its entirety.

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BACKGROUND

[0003] Today's wagering game machine may include a computerized system controlling a video display and/or reels to present wagering games such as slots, video card games (poker, blackjack etc.), video keno, video bingo, video pachinko and other games available in the gaming industry. Such machines may form part of a wagering game network of machines and servers. Various peripherals may be coupled to individual wagering game machines to increase the variety of interaction available between the machines and those that play the games presented on them.

BRIEF DESCRIPTION OF THE FIGURES

[0004] Embodiments of the invention are illustrated by way of example and not limitation in the Figures of the accompanying drawings in which:

[0005] FIG. 1 is a block diagram illustrating a wagering game machine architecture according to various embodiments;

[0006] FIG. 2 is a block diagram illustrating a wagering game network, according to various embodiments;

[0007] FIG. 3 is a flow chart illustrating methods according to various embodiments;

[0008] FIG. 4 is a perspective view of a wagering game machine, according to various embodiments; and

[0009] FIG. 5 is a perspective view of a portable wagering game machine, according to various embodiments.

DESCRIPTION OF THE EMBODIMENTS

Example Operating Environment

Example Wagering Game Machine Architecture

[0010] The universal serial bus (USB) allows wagering game machine peripherals to communicate utilizing a standard protocol that encompasses both hardware and software. Generally, when a USB peripheral is connected to a wagering game machine USB port, USB protocol determines what the peripheral is and what software driver can be used to interface to it. For more specific information regarding the USB protocol, the reader is encouraged to consult the Universal Serial Bus Specification Version 2.0 (2000), published by USB-IF; 5440 SW Westgate Drive, Suite 217; Portland, Oreg. 97221, and amendments thereto, all incorporated herein by reference.

[0011] The inventors have discovered that when there are multiple identical USB peripherals coupled to a single wagering game machine, the same software driver will often be used for each of the peripherals, with little or no distinction made between them. This is because each peripheral receives a random unique identification number during what is known to those of ordinary skill in the art as the "enumeration process." Unfortunately, the enumeration process does not provide a way to physically distinguish which of the identical peripherals is which.

[0012] For example, if three USB keyboards are connected to a single computer, the same driver might be used for all three keyboards and any keyboard can be used with no distinction as to its location. The same thing can occur when two identical USB-compatible displays are coupled to a single computer. No distinction might be made between the upper display and the lower display, for example. This situation poses a problem in the gaming environment, where it may be desirable for a wagering game machine to interact differently when someone touches a first touch screen versus a second identical USB touch screen in a different physical location, for example, and the system electronics/software do not distinguish between either of the two screens as to location.

[0013] The inventors have discovered three different ways to solve this problem: a software-centric approach, a hardware-centric approach, and a peripheral sequencing approach. In each case, the association of a physical location with individual peripherals allows the processor and/or a USB peripheral controller to respond appropriately to information received. Examples of various embodiments will be described in combination with the figures in further detail below.

[0014] FIG. 1 is a block diagram illustrating a wagering game machine architecture 100 according to various embodiments of the invention. As shown in FIG. 1, an apparatus 106, such as a wagering game machine, includes a central processing unit (CPU) 126 connected to main memory 128, which in turn may include wagering game machine software 132. The CPU 126 may include multiple processing cores, a USB peripheral controller, and other elements.

[0015] The main memory 128 may be subdivided into portions, such as a first portion memory 134 and second portion memory 136. Each of the portions of memory 134, 136 may comprise volatile memory, non-volatile memory, and combinations thereof. Thus, wagering game machine software 132 may be stored in the memory 136, which may take the form, in whole or in part, of non-volatile memory, including FLASH memory, phase-change memory, and read-only memory, among others. In many embodiments, the wagering game machine software 132 is associated with the presentation of a wagering game, and when executed, can be used to present wagering games upon which monetary value may be wagered. Such games include video poker, video blackjack, video slots, video lottery, etc.

[0016] The wagering game machine software 132 may alternatively, or in addition, be stored in a mass storage unit 140, which may comprise one or more mass storage devices 140, including a disk drive, such as a hard disk drive or an optical disc drive (e.g., a compact disc, read-only memory disc drive), a flash memory drive, or some combination of these.
The CPU 126 may also be connected to an input/output (I/O) bus 122, which facilitates communication between the components of the apparatus 106. The I/O bus 122 is connected to a payout mechanism 108, primary display 110, secondary display 112, value input device 114, player input device 116, information reader 118, and storage unit 130. The bus 122 may include one or more portions, any one or more of which may comprise a universal serial bus. Thus, any of the components coupled to the bus 122 may comprise USB peripherals.

The player input device 116 can include the value input device 114 to the extent the player input device 116 is used to place wagers. The I/O bus 122 may be connected to an external system interface 124, which can be coupled to external systems 104 (e.g., wired and wireless wagering game networks). The external system interface 124 may comprise a network interface card for use with wired networks 164, and/or a wireless transceiver that enables the apparatus 106 to communicate with wireless networks. Thus, the apparatus 106 may comprise a portable wagering game machine having a wireless transceiver (e.g., see FIG. 5).

In one embodiment, the apparatus 106 can include additional peripheral devices and/or more than one of each component shown in FIG. 1. For example, in one embodiment, the apparatus 106 can include multiple external system interfaces 124 and multiple processors 126. In one embodiment, any of the components can be integrated or subdivided. Additionally, in one embodiment, the components of the apparatus 106 can be interconnected according to any suitable interconnection architecture (e.g., directly connected, serially connected, star network, hypercube, etc.).

In one embodiment, any of the components of the apparatus 106 can include hardware, firmware, and/or software for performing the operations described herein. Thus, some embodiments may include an article comprising a machine readable medium having instructions stored thereon, wherein the instructions, when executed by one or more processors, result in performing any of the methods described herein. Machine-readable media includes any mechanism that provides (e.g., stores and/or transmits) information in a form readable by a machine (e.g., a wagering game machine, computer, etc.). For example, tangible machine-readable media includes read only memory (ROM), random access memory (RAM), magnetic disk storage media, optical storage media, flash memory drives, etc. Thus, many embodiments may be realized.

For example, an apparatus 106, perhaps forming part of a wagering game machine, may comprise one or more processors 126 and a software program 132 which, when executed by the processor(s) 126, is associated with presenting a wagering game upon which monetary value may be wagered.

Using a software-centric mechanism, it is possible to determine the difference between similar or identical devices on a USB bus by using information gained during the USB enumeration process, such as the Vendor Identification (ID), Product ID, and Serial Number along with some type of user input. For example, the apparatus 106 may operate to discover the existence of all USB peripherals coupled to the bus 122 after the apparatus 106 undergoes a “RAM clear” operation (known to those of ordinary skill in the art in the gaming industry to mean volatile portions of the memory 128 in the apparatus are cleared or reset to a known value). The apparatus 106 might then operate, in some embodiments, to display the list of devices discovered to a technician that initiated the RAM clear operation, and then prompt the technician to accept the list that is displayed.

If multiple devices have been discovered with the same Vendor ID and/or Product ID, then the technician might be presented with an option to determine the physical location of each device. For example, consider the operation of a video slot machine with two monitors, each having a USB-compatible touch screen. After a RAM clear operation is completed, the monitors might be used to display the list of USB devices that have been discovered, and specifically show that two of these include touch screens. Both touch screen peripherals would be enabled, and the technician might be prompted to touch the main (e.g., bottom console) touch screen. Once the main touch screen was identified, it would be associated with a physical location (e.g., the bottom console), and the other touch screen could be located without prompting, since the processor 126 might be programmed to know that only two touch screens can be connected for a particular machine, and they exist in only two locations—the bottom console and the top console. In some embodiments, the technician might also be prompted to touch the secondary touch screen (e.g., on the top console) as a redundant location check.

As another example, consider what may occur following the discovery of two USB-compatible monitors (one each on the top and bottom console) after power is applied to a wagering game machine. Both monitors would be enabled, and the technician might be prompted to press a button on the panel of the machine when the proper location of the top console monitor was correctly displayed on that monitor (e.g., if the top console monitor displayed “BOTTOM CONSOLE” then the technician would refrain from pressing the button). Once the top console monitor was identified, it would be associated with a physical location (e.g., the top console), and the other monitor could be located without prompting, since the processor 126 might be programmed to know that only two monitors could be connected for a particular machine, and only existing in two locations—the bottom console and the top console. In some embodiments, the technician might also be prompted to verify the location of the monitor on the bottom console as a redundant location check.

Finally, consider the example of activity the might follow the discovery of two USB-compatible game buttons (side-by-side on the top panel of the bottom console) after power is applied to a wagering game machine. Both buttons would be enabled, and the technician might be prompted to press the left-most button (or the “RED” button if there are RED and BLUE buttons) some designated number of times. Once the first button was identified, it would be associated with a physical location (e.g., left side of bottom console), and the other button could be located without prompting (e.g., right side of bottom console), as noted for other devices above. In some embodiments, the technician might also be prompted to verify the location of the right-most button (or “BLUE” button) on the bottom console panel as a redundant location check.

In any event, the physical location of each touch screen might then be stored in a table 138 in the memory 134, perhaps along with one or more of the Vendor ID, the Product ID, and/or the serial number of each touch screen. The serial number for each USB device so located would then be associated with the top and bottom consoles until another RAM
clear operation was performed (assuming that the portion of memory 134 in which the table 138 comprises volatile memory).

[0027] The table 138 might also be located in non-volatile memory so that each device could be recognized by the serial number and selected location across reset cycles. For the purposes of this document, a “reset cycle” means an event which causes volatile memory in the apparatus 106 to alter its contents, such as a processor reboot or wagering game machine power cycle operation. The content of non-volatile memory is not affected. In any case, whether or not the memory 128 comprises non-volatile memory, the memory 128 may be used to store a data structure (e.g., the table 138, or some other associative structure) that associates the matching identification information 170 with a plurality of predetermined physical locations (e.g., top and bottom consoles of a wagering game machine).

[0028] In some embodiments, a more hardware-centric mechanism may be implemented to locate peripherals. For example, location indication devices DEV1, DEV2 might be attached to or associated with identical USB peripherals (e.g., displays 110, 112) to provide information LOC1, LOC2 to enable associating each one of the USB peripherals having the matching identification information 170 with a corresponding predetermined physical location (e.g., the information LOC1 may indicate that the display 110 is located in the bottom console, while the information LOC2 may indicate that the display 112 is located in the top console).

[0029] In some embodiments, standard, unmodified off-the-shelf USB peripherals might be used in conjunction with one or more “dongles” 162 or hardware keys that include location-specific identification devices. For example, a dongle 162 might contain a USB hub (e.g., a single-port USB hub).

[0030] As shown in FIG. 1, the dongles 162 that incorporate USB hubs are each coupled to identical USB peripherals 156 (e.g., two or more touch screens, keyboards, joy sticks, slot machine reel controllers, video screens, and/or light boards, etc.). The CPU 126 can discover the address of each peripheral based on the hub to which it is attached, and each of the hubs HUB1, HUB2 can provide a device to distinguish its physical location of the peripheral to which it is attached. For example, a dual-inline package (DIP) switch or some other hardware device (e.g., similar to or identical to the devices DEV1, DEV2, such as a physical location indication circuit 166) could be located on the USB hub/dongle and set to code the location LOC of the peripheral 156 coupled to that particular dongle 162 (e.g., all switches set to OFF means bottom console, all switches set to ON means top console, and various other combinations can be used for more specific locations, such as “001” binary for “attached to the upper front panel of the bottom console”). Alternatively, the dongle 162 might contain non-volatile memory that is programmed to indicate the physical location of the peripheral to which it is coupled.

[0031] In some embodiments, the Product ID that is returned from the dongle 162 including a USB hub is modified based on the setting the attached DIP switch or stored in the included non-volatile memory. By intercepting the information that is received during the USB enumeration process and inserting known information in its place, the CPU 126 can determine which Product ID number is associated with one USB peripheral 156 that happens to be located on the top console, and another USB peripheral 156 that happens to be located on the bottom console, for example. In some cases, ID information received directly from USB peripherals, instead of from USB hubs, may be intercepted and modified.

[0032] In other embodiments, peripheral sequencing may be employed. For example, external enable or power signals 168 may be controlled by the CPU 126, enabling or turning on each of the peripherals 156 and/or dongles 162 in a known sequence so that the standard USB enumeration process occurs with respect to one of the similar/identical USB peripherals at a time. In this way, the CPU 126 can associate the random enumeration given as part of the power-up or sequence with a peripheral at a known physical location. For example, the upper and lower panels of the bottom console might be enabled or powered in sequence, and each USB peripheral at those locations can also be enumerated. Thus, at a later time, the top console of the wagering game machine can be enabled or powered, and the USB peripherals located there can be enumerated. Once the enumeration of peripherals is complete, the association with locations can be stored and recalled by the CPU 126 whenever desired.

[0033] Another approach might include enabling or powering the USB peripherals 156 directly (e.g., via line 168†), without the use of dongles 162, perhaps via the use of an enable input terminal, or simply by turning on the power to each peripheral device in a sequence of locations controlled by the CPU 126.

[0034] Thus, many embodiments may be realized. For example, an apparatus 106 may comprise one or more processors 126 and a memory 136 to store at least a portion of a software program 132 which, when executed by at least one processor 126, is associated with presenting a wagering game upon which monetary value may be wagered. The apparatus 106 may also include a plurality of USB peripherals (e.g., displays 110, 112) to provide matching identification information 170 as part of a power-up sequence initiated prior to presenting the wagering game.

[0035] In some embodiments, the apparatus 106 may include a corresponding plurality of location indication devices DEV1, DEV2 to provide information to enable associating each one of the USB peripherals 110, 112 having the matching identification information 170 with a corresponding predetermined physical location. The location indication devices DEV1, DEV2 may include one or more of a global positioning system (GPS) location circuit, an orientation-sensitive switch, a radiofrequency identification (RFID) device, a power supply line (e.g., line 168†), an enable line (e.g., line 168†), or a non-volatile memory having location-specific information stored therein (e.g., a circuit 166 having a non-volatile memory with location information LOC). The devices DEV1, DEV2 can be attached directly to peripherals 110, 112, 156, or plugged into them as part of the wiring harness, etc.

[0036] Additional embodiments may be realized. For example, an apparatus 106 may comprise one or more processors 126, a memory 128 to store at least a portion of a software program 132 which, when executed by at least one processor 126, is associated with presenting a wagering game upon which monetary value may be wagered. The apparatus 106 may further include a plurality of USB peripherals 156 to provide matching identification information 170 as part of a power-up sequence initiated prior to presenting the wagering game.

[0037] In some embodiments, the apparatus 106 may include a peripheral location module (PLM) 148 to initiate
queries with respect to the location of various USB peripherals 156. Thus, the apparatus 106 may include one or more of a corresponding plurality of USB hubs (e.g., perhaps incorporated into the dongles 162) and a user input device 116 to provide information, responsive to queries 152 provided by a PLM 148, to enable associating each one of the USB peripherals 156 having the matching identification information 170 with a corresponding predetermined physical location. In this case, the user input device 116 and/or USB hubs may be used to locate the peripherals 156. As noted previously, the user input device 116 might comprise a keyboard, a touch screen, and/or a joystick, among other devices.

[0038] One or more of the dongles 162 may include a physical location indication circuit 166. Thus, in various embodiments, the physical location indication circuit 166 might comprise a switch having plural settings, a hard-coded conductor value, a GPS location circuit, an orientation-sensitive switch, a radio-location device, an RFID device, a power supply line, an enable line, and/or a non-volatile memory having location-specific information stored therein. That is, USB peripheral devices (e.g., displays 110, 112) may include location-specific identifier circuitry DEV1, DEV2, and/or the dongles 162 may include location-specific identifier circuitry 166 of their own.

[0039] While FIG. 1 describes several embodiments of a wagering game machine architecture, FIG. 2 shows how a plurality of wagering game machines can be connected in a wagering game network.

Example Wagering Game Network

[0040] FIG. 2 is a block diagram illustrating a wagering game network 200, according to various embodiments of the invention. As shown in FIG. 2, the wagering game network 200 includes a plurality of casinos 212 connected to a communications network 214.

[0041] Each of the plurality of casinos 212 includes a local area network 216, which may include a wireless access point 204, a wagering game machines 202, and a wagering game server 206 that can serve wagering games over the local area network 216. As such, the local area network 216 includes wireless communication links 210 and wired communication links 208. The wired and wireless communication links can employ any suitable connection technology, such as Bluetooth, 802.11, Ethernet, public switched telephone networks, SONET, etc. In one embodiment, the wagering game server 206 can serve wagering games and/or distribute content to devices located in one or more of the other casinos 212 or at other locations on the communications network 214.

[0042] The wagering game machines 202 and wagering game server 206 can include hardware and machine-readable media including instructions for performing the operations described herein. The wagering game machines 202 may be similar to or identical to the apparatus 106 shown in FIG. 1.

[0043] The wagering game machines 202 described herein can take any suitable form, such as floor standing models, handheld mobile units, bartop models, workstation-type console models, etc. Further, the wagering game machines 202 can be primarily dedicated for use in conducting wagering games, or can include non-dedicated devices, such as mobile phones, personal digital assistants, personal computers, etc. In one embodiment, the wagering game network 200 can include other network devices, such as accounting servers, wide area progressive servers, and player tracking servers.

[0044] In various embodiments, wagering game machines 202 and wagering game servers 206 work together such that a wagering game machine 202 may be operated as a thin, thick, or intermediate client. For example, one or more elements of game play may be controlled by the wagering game machine 202 (client) or the wagering game server 206 (server). Game play elements may include executable game code, lookup tables, configuration files, game outcome, audio or visual representations of the game, game assets or the like. In a thin-client example, the wagering game server 206 may perform functions such as determining game outcome or managing assets, while the wagering game machine 202 may be used merely to present the graphical representation of such outcome or asset modification to the user (e.g., player). In a thick-client example, game outcome may be determined locally (e.g., at the wagering game machine 202) and then communicated to the wagering game server 206 for recording or managing a player’s account.

[0045] Similarly, functionality not directly related to game play may be controlled by the wagering game machine 202 (client) or the wagering game server 206 (server) in some embodiments. For example, power conservation controls that manage a display screen’s light intensity may be managed centrally (e.g., by the wagering game server 206) or locally (e.g., by the wagering game machine 202). Other functionality not directly related to game play may include presentation of advertising, software or firmware updates, system quality or security checks, etc.

[0046] Thus, other embodiments may be realized. For example, a wagering game system may comprise one or more wagering game machines 202, each of which may be configured to operate in a manner similar to or identical to the apparatus 106 of FIG. 1. The system may include one or more location indication devices (LIDs) 280 to provide information to enable associating each one of the USB peripherals in the wagering game machines 202 having the matching identification information with a corresponding predetermined physical location. The system may also include a wagering game server 206 to couple to the wagering game machines 202.

[0047] The LIDs 280 may comprise one or more of a USB hub, a GPS location circuit, an orientation-sensitive switch, a radio-location device, an RFID device, a power supply line, an enable line, and/or a non-volatile memory having location-specific information stored therein. The LIDs 280 may be located inside or outside (shown in FIG. 2) of a housing containing the wagering game machine 202. Thus, for example, the LIDs 280 may comprise an RF sniffer mechanism or a portion of a differential GPS receiver to physically locate a USB peripheral device currently responding to USB protocol queries.

Example Operations

[0048] FIG. 3 is a flow chart illustrating methods 311 according to various embodiments of the invention. In some embodiments, a method 311 that operates to identify similar or identical USB peripherals and associate them with a predetermined physical location may begin at block 321 with clearing volatile memory in a wagering game machine (e.g., initiating a RAM clear operation prior to presenting a wagering game on the wagering game machine).

[0049] The method 311 may continue on to block 325 with receiving matching identification information from a plurality of USB peripherals communicatively coupled to the wagering game machine. The matching identification information may comprise one or more of a Product ID, a Vendor ID, and/or device driver identification. Thus, the fact that USB peripherals are identical might be determined because they are found to share a common device driver in some cases.
In some embodiments, receiving at block 325 may comprise presenting a query associated with a selected one of the plurality of USB peripherals on a video screen, and receiving information indicating the corresponding predetermined physical location. An example of such activity includes presenting a human-sensible signal associated with at least one of the USB peripherals, and receiving, in response, an indication of user input device activation. The human-sensible signal might comprise a query on a video display, and the indication might result from detecting one or more of a keyboard input, a touch screen input, a voice recognizer input, and/or a joystick input. This includes, for example, the activity of prompting a technician to manipulate some specific device attached to a wagering game machine (e.g., touching a touch screen attached to the top console), and receiving feedback therefrom. In a more hardware-centric system, receiving at block 325 may include, or alternatively comprise, receiving information from at least one location indication device to enable associating each one of the USB peripherals having the matching identification information with a corresponding predetermined physical location.

The method 311 may continue on to block 329 with communicating with USB hubs coupled in a one-to-one correspondence to each one of the USB peripherals having the matching identification information. Such communication may include communicating with at least one USB hub to determine the corresponding physical location to associate with at least one of the plurality of USB peripherals. For example, communicating may include communicating with at least one USB hub coupled in a one-to-one correspondence with at least one of the USB peripherals having matching identification information to obtain location-specific information assigned to the at least one USB hub. This may occur when the USB hubs have location information that is uniquely-assigned to each hub, so that in some instances, only one hub is addressed (e.g., to determine which touch screen is located in the top console—a second touch screen, by default, would then be located in the bottom console of some wagering game machines).

In some embodiments, the method 311 may include, at block 335, modifying at least some of the matching identification information provided by one or more of the USB peripherals, or hub identification information provided by USB hubs coupled to the USB peripherals, to provide modified information, and then processing the modified information as location indication information when communications are conducted with the USB peripherals. This may occur, for example, when the received Product ID, and/or other ID information, is forced to assume a modified value. Such information may be obtained from USB peripherals, USB hubs, or both, and either one or both sets of information may be modified, either repeatedly, or one time (to be stored and recalled as needed thereafter).

At block 341, the method 311 may include determining whether power sequencing will be used to individually address USB peripherals in different physical locations. If power sequencing is not to be used, then the method 311 may include applying an enable signal at block 345 to at least some of the USB peripherals (and/or the dongles associated with the peripherals) having matching identification information in a predetermined sequence associated with multiple physical locations. If power sequencing is to be used, then the method 311 may include applying power at block 349 to at least some of the USB peripherals (and/or the dongles associated with the peripherals) having the matching identification information in a predetermined sequence associated with multiple physical locations. Thus, the peripherals and/or associated dongles may be enabled and/or powered-up in a predetermined sequence, according to various physical locations, as described previously.

The method 311 may conclude at block 355 with associating each one of the USB peripherals having matching identification information with a corresponding predetermined physical location. It should be noted that unless specifically claimed otherwise, the methods described herein do not have to be executed in the order described, or in any particular order. Moreover, various activities described with respect to the methods identified herein can be executed in iterative, repetitive, serial, or parallel fashion. Information, including parameters, commands, operands, and other data, can be sent and received in the form of one or more carrier waves.

Example Wagering Game Machines

Example Wagering Game Machine

FIG. 4 is a perspective view of a wagering game machine 400, according to various embodiments of the invention. Referring to FIG. 4, a wagering game machine 400 is used in gaming establishments, such as casinos. According to most embodiments, the wagering game machine 400 can be any type of wagering game machine and can have varying structures and methods of operation. For example, the wagering game machine 400 can be an electromechanical wagering game machine configured to play mechanical slots, or it can be an electronic wagering game machine configured to play video casino games, such as blackjack, slots, keno, poker, blackjack, roulette, etc. The wagering game machine 400 may include one or more of the apparatus 106 of FIG. 1, and may be used in a network in the same was as the machines 202 of FIG. 2.

The wagering game machine 400 comprises a housing 412 and includes input devices, including value input devices 418 and a player input device 424. For output, the wagering game machine 400 includes a primary display 414 for displaying information about a basic wagering game. The primary display 414 can also display information about a bonus wagering game and a progressive wagering game. The wagering game machine 400 also includes a secondary display 416 for displaying wagering game events, wagering game outcomes, and/or signage information. While some components of the wagering game machine 400 are described herein, numerous other elements can exist and can be used in any number or combination to create varying forms of the wagering game machine 400.

The value input devices 418 can take any suitable form and can be located on the front of the housing 412. The value input devices 418 can receive currency and/or credits inserted by a player. The value input devices 418 can include coin acceptors for receiving coin currency and bill acceptors for receiving paper currency. Furthermore, the value input devices 418 can include ticket readers or barcode scanners for reading information stored on vouchers, cards, or other tangible portable storage devices. The vouchers or cards can be processed to access to central accounts, which can transfer money to the wagering game machine 400.

The player input device 424 comprises a plurality of push buttons on a button panel 426 for operating the wagering game machine 400. In addition, or alternatively, the player input device 424 can comprise a touch screen 428 mounted over the primary display 414 and/or secondary display 416.

The various components of the wagering game machine 400 can be connected directly to, or contained within, the housing 412. Alternatively, some of the wagering
The operation of the basic wagering game can be displayed to the player on the primary display 414. The primary display 414 can also display a bonus game associated with the basic wagering game. The primary display 414 can include a cathode ray tube (CRT), a high resolution liquid crystal display (LCD), a plasma display, light emitting diodes (LEDs), or any other type of display suitable for use in the wagering game machine 400. Alternatively, the primary display 414 can include a number of mechanical reels to display the outcome. In FIG. 4, the wagering game machine 400 is an "upright" version in which the primary display 414 is oriented vertically relative to the player. Alternatively, the wagering game machine can be a "slant-top" version in which the primary display 414 is slanted at about a thirty-degree angle toward the player of the wagering game machine 400. In yet another embodiment, the wagering game machine 400 can exhibit any suitable form factor, such as a free standing model, bust up model, mobile handheld model, or workstation console model.

A player begins playing a basic wagering game by making a wager via the value input device 418. The player can initiate play by using the player input device's buttons or touch screen 428. The basic game can include arranging a plurality of symbols along a payline 432, which indicates one or more outcomes of the basic game. Such outcomes can be randomly selected in response to player input. At least one of the outcomes, which can include any variation or combination of symbols, can trigger a bonus game.

In some embodiments, the wagering game machine 400 can include an information reader 452, which can include a card reader, ticket reader, bar code scanner, RFID transceiver, or computer readable storage medium interface. In some embodiments, the information reader 452 can be used to award complimentary services, restore game assets, track player habits, etc.

Example Wagering Game Machine

FIG. 5 is a perspective view of a portable wagering game machine 500, according to various embodiments of the invention. Like free standing wagering game machines, in a handheld or mobile form, the wagering game machine 500 can include any suitable electronic device configured to play a video casino games such as blackjack, slots, keno, poker, blackjack, and roulette. The wagering game machine 500 may include one or more of the apparatus 106 of FIG. 1, and may be coupled to a network in the same manner as the machines 202 of FIG. 2.

The wagering game machine 500 comprises a housing 512 and includes input devices, including a value input device 518 and a player input device 524. For output, the wagering game machine 500 includes a primary display 514, a secondary display 516, one or more speakers 517, one or more player-accessible ports 519 (e.g., an audio output jack for headphones, a video output jack, a video input jack, etc.), and other conventional I/O devices and ports, which may or may not be player-accessible. In the embodiment depicted in FIG. 5, the wagering game machine 500 comprises a secondary display 516 that is rotatable relative to the primary display 514. The optional secondary display 516 can be fixed, movable, and/or detachable/attachable relative to the primary display 514. Either the primary display 514 and/or secondary display 516 can be configured to display any aspect of a non-wagering game, wagering game, secondary game, bonus game, progressive wagering game, group game, shared-experience game or event, game event, game outcome, scrolling information, text messaging, emails, alerts or announcements, broadcast information, subscription information, and wagering game machine status.

The player-accessible value input device 518 can comprise, for example, a slot located on the front, side, or top of the housing 512 configured to receive coin from a stored-value card (e.g., casino card, smart card, debit card, credit card, etc.) inserted by a player. The player-accessible value input device 518 can also comprise a sensor (e.g., an RF sensor) configured to sense a signal (e.g., an RF signal) output by a transmitter (e.g., an RF transmitter) carried by a player. The player-accessible value input device 518 can also or alternatively include a ticket reader, or barcode scanner, for reading information stored on a credit ticket, a card, or other tangible portable credit or funds storage device. The credit ticket or card can also authorize access to a credit account, which can transfer money to the wagering game machine 500.

Still other player-accessible value input devices 518 can require the use of touch keys 530 on the touch-screen display (e.g., primary display 514 and/or secondary display 516) or player input devices 524. Upon entry of player identification information and, preferably, secondary authorization information (e.g., a password, PIN number, stored value card number, predefined key sequences, etc.), the player can be permitted to access a player's account. As one potential optional security feature, the wagering game machine 500 can be configured to permit a player to access only accounts the player has specifically set up for the wagering game machine 500. Other security features can also be utilized, for example, to prevent unauthorized access to a player's account, to minimize an impact of any unauthorized access to a player's account, or to prevent unauthorized access to any personal information or funds temporarily stored on the wagering game machine 500.

The player input device 524 comprises a plurality of push buttons on a button panel for operating the wagering game machine 500. In addition, or alternatively, the player input device 524 can comprise a touch screen mounted to a primary display 514 and/or secondary display 516. In one aspect, the touch screen is matched to a display screen having one or more selectable touch keys 530 selectable by a user's touching of the associated area of the screen using a finger or a tool, such as a stylus pointer. A player enables a desired function either by touching the touch screen at an appropriate touch key 530 or by pressing an appropriate push button on the button panel. The touch keys 530 can be used to implement the same functions as push buttons. Alternatively, the push buttons 532, can provide inputs for one aspect of the operating the game, while the touch keys 530 can allow for input needed for another aspect of the game. The various components of the wagering game machine 500 can be connected directly to, or contained within, the housing 512, or can be located outside the housing 512 and connected to the housing 512 via a variety of wired or wireless connection methods. Thus, the wagering game machine 500 can comprise a single unit or a plurality of interconnected (e.g., wireless connections) parts which can be arranged to suit a player's preferences.

The operation of the basic wagering game on the wagering game machine 500 is displayed to the player on the primary display 514. The primary display 514 can also display the bonus game associated with the basic wagering game. The primary display 514 preferably takes the form of a high resolution LCD, a plasma display, an LED, or any other type of display suitable for use in the wagering game machine.
The size of the primary display 514 can vary from, for example, about a 2-3" display to a 15" or 17" display. In at least some embodiments, the primary display 514 is a 7"-10" display. In one embodiment, the size of the primary display can be increased. Optionally, coatings or removable films or sheets can be applied to the display to provide desired characteristics (e.g., privacy, anti-scratch, anti-glare, bacteriologically resistant and anti-microbial films, etc.). In at least some embodiments, the primary display 514 and/or secondary display 516 can have a 15:9 aspect ratio or other aspect ratio (e.g., 4:3). The primary display 514 and/or secondary display 516 can also have each different resolutions, different color schemes, and different aspect ratios.

As with the free standing embodiments a wagering gaming machine, a player begins play of the basic wagering game on the wagering game machine 500 by making a wager (e.g., via the value input device 518 or an assignment of credits stored on the handheld gaming machine via the touch screen keys 530, player input device 524, or buttons 532) on the wagering game machine 500. In some embodiments, the basic game can comprise a plurality of symbols arranged in an array, and includes at least one payline 528 that indicates one or more outcomes of the basic game. Such outcomes can be randomly selected in response to the wagering input by the player. At least one of the plurality of randomly selected outcomes can be a start-bonus outcome, which can include any variations of symbols or symbol combinations triggering a bonus game.

In some embodiments, the player-accessible value input device 518 of the wagering game machine 500 can double as a player information reader 552 that allows for identification of a player by reading a card with information indicating the player’s identity (e.g., reading a player’s credit card, player ID card, smart card, etc.). The player information reader 552 can alternatively or also comprise a bar code scanner, RFID transceiver or computer readable storage medium interface. In one embodiment, the player information reader 552 comprises a biometric sensing device.

Implementing the apparatus, systems, and methods disclosed herein may permit distinguishing, in a location-specific fashion, multiple USB peripherals that appear to the processor and/or USB controller in a wagering game machine as substantially identical in other respects. This capability facilitates the use of identical peripherals for cost-effective stocking and ease of replacement, while at the same time realizing the benefits of providing multiple peripherals deployed in a variety of locations about the same wagering game machine. An increase in player satisfaction, and additional revenue for the owners of the machines, may result.

In this detailed description, reference is made to specific examples by way of drawings and illustrations. These examples are described in sufficient detail to enable those skilled in the art to practice the inventive subject matter, and serve to illustrate how the inventive subject matter can be applied to various purposes or embodiments. Other embodiments are included within the inventive subject matter, as logical, mechanical, electrical, and other changes can be made to the example embodiments described herein. Features or limitations of various embodiments described herein, however essential to the example embodiments in which they are incorporated, do not limit the inventive subject matter as a whole, and any reference to the invention, its elements, operation, and application are not limiting as a whole, but serve only to define these example embodiments.

Such embodiments of the inventive subject matter may be referred to herein individually or collectively by the term “invention” merely for convenience and without intending to voluntarily limit the scope of this application to any single invention or inventive concept, if more than one is in fact disclosed. Thus, although specific embodiments have been illustrated and described herein, any arrangement calculated to achieve the same purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the above description.

The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.72(b), requiring an abstract that will allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Description of the Embodiments, it can be seen that various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted to require more features than are expressly recited in each claim. Rather, inventive subject matter may be found in less than all features of a single disclosed embodiment. Thus the following claims are hereby incorporated into this detailed description, with each claim standing on its own as a separate embodiment.

1. A method, comprising:
   receiving matching identification information from a plurality of universal serial bus peripherals communicatively coupled to a wagering game machine; and
   associating each one of the universal serial bus peripherals having the matching identification information with a corresponding predetermined physical location, the physical location being uniquely specified in relation to the wagering game machine.

2. The method of claim 1, wherein the matching identification information comprises:
   at least one of a product identification, a vendor identification, or a device driver identification.

3. The method of claim 1, wherein the receiving comprises:
   presenting a human-sensible signal associated with at least one of the universal serial bus peripherals having the matching identification information; and
   receiving an indication of a user input device activation.

4. The method of claim 3, wherein the human-sensible signal comprises a query on a video display, and wherein the indication results from detecting at least one of a keyboard input, a touch screen input, a voice recognizer input, or a joystick input.

5. (canceled)

6. The method of claim 1, comprising:
   communicating with at least one universal serial bus hub coupled in a one-to-one correspondence with at least one of the universal serial bus peripherals having the matching identification information to obtain location-specific information assigned to the at least one universal serial bus hub.

7. The method of claim 1, comprising:
   modifying at least some of the matching identification information provided by some of the plurality of universal serial bus peripherals, or hub identification information provided by at least one universal serial bus hub
coupled to the plurality of universal serial bus peripherals, to provide modified information; and processing the modified information as location indication information when communicating with the plurality of universal serial bus peripherals.

9. The method of claim 1, comprising:
applying at least one of an enable signal or power to at least some of the universal serial bus peripherals having the matching identification information in a predetermined sequence associated with multiple physical locations.

10. (canceled)

11. An apparatus, comprising:
at least one processor;
a memory to store at least a portion of a software program which, when executed by the at least one processor, is associated with presenting a wagering game upon which monetary value may be wagered;
a plurality of universal serial bus peripherals to provide matching identification information as part of a power-up sequence initiated prior to presenting the wagering game; and
at least one of a location indication device, a universal serial bus hub, or a user input device to provide information to enable associating each one of the universal serial bus peripherals having the matching identification information with a corresponding predetermined physical location, the physical location being uniquely specified in relation to the wagering game machine.

12. The apparatus of claim 11, wherein the location indication device includes at least one of a global positioning system (GPS) location circuit, an orientation-sensitive switch, a radiolocation device, a radio frequency identification (RFID) device, a power supply line, an enable line, or a non-volatile memory having location-specific information stored therein.

13. The apparatus of claim 11, comprising:
a memory to store a data structure associating the matching identification information with a plurality of physical locations.

14. The apparatus of claim 11, wherein the information is provided responsive to queries provided by a peripheral location module.

15. The apparatus of claim 11, wherein the user input device comprises one of a keyboard, a touch screen, and a joystick.

16. The apparatus of claim 11, wherein universal serial bus hub includes a physical location indication circuit.

17. The apparatus of claim 16, wherein the physical location indication circuit comprises:
a switch having plural settings, a hard-coded conductor value, a global positioning system (GPS) location circuit, an orientation-sensitive switch, a radiolocation device, a radio frequency identification (RFID) device, a power supply line, an enable line, and a non-volatile memory having location-specific information stored therein.

18. The apparatus of claim 11, wherein the plurality of universal serial bus peripherals to provide matching identification information comprise:
at least one of a pair of slot machine reel controllers, a pair of video screens, a pair of touch screens, a pair of keyboards, a pair of joysticks, or a pair of light boards.

19. A system, comprising:
a wagering game machine having at least one processor, a memory to store at least a portion of a software program which, when executed by the at least one processor, is associated with presenting a wagering game upon which monetary value may be wagered, and a plurality of universal serial bus peripherals to provide matching identification information as part of a power-up sequence initiated prior to presenting the wagering game;
at least one of a location indication device or a user input device to provide information to enable associating each one of the universal serial bus peripherals having the matching identification information with a corresponding predetermined physical location, the physical location being uniquely specified in relation to the wagering game machine; and
a wagering game server to couple to the wagering game machine.

20. The system of claim 19, wherein the location indication device comprises a universal serial bus hub, a global positioning system (GPS) location circuit, an orientation-sensitive switch, a radiolocation device, a radio frequency identification (RFID) device, a power supply line, an enable line, or a non-volatile memory having location-specific information stored therein.

21. The system of claim 19, wherein the location indication device is located outside of a housing containing the wagering game machine.

22. (canceled)

23. The method of claim 1, comprising:
presenting a query associated with a selected one of the plurality of universal serial bus peripherals on a video screen; and receiving information indicating the corresponding predetermined physical location.

24. The method of claim 1, comprising:
receiving information from at least one location indication device to enable associating each one of the universal serial bus peripherals having the matching identification information with the corresponding predetermined physical location.

25. (canceled)