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(54) **SYSTEMS AND METHODS FOR CASINO GAMING HAPTICS**

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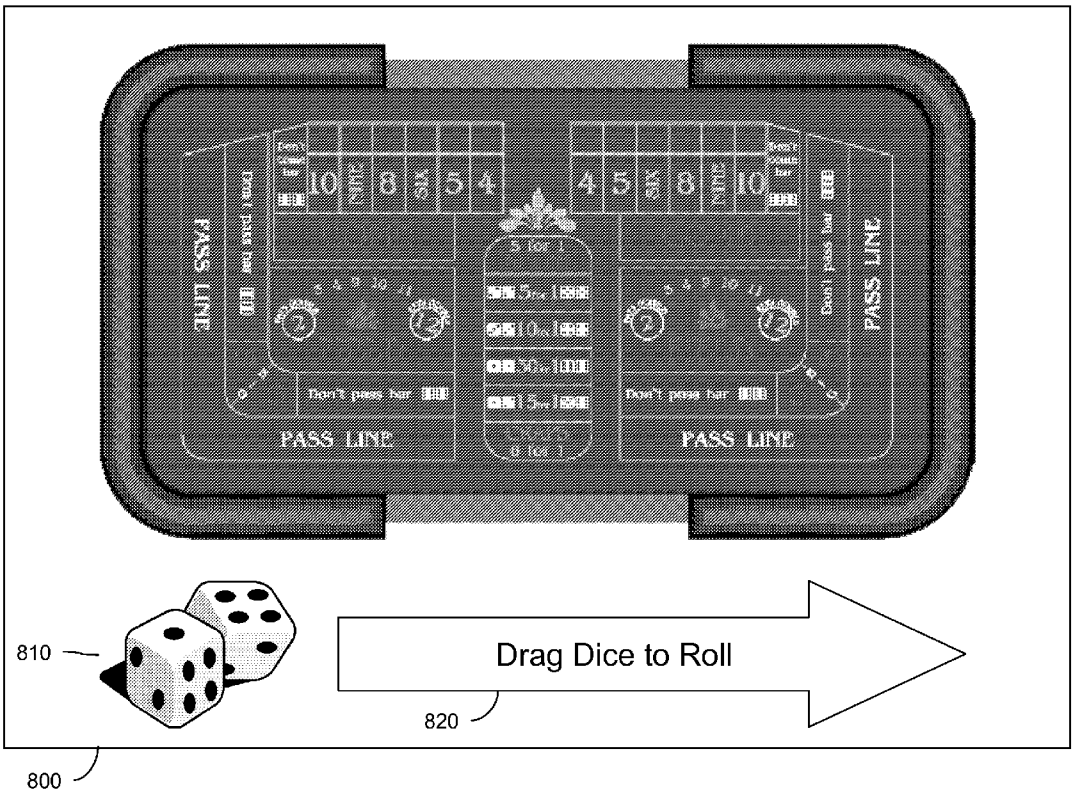
(52) **U.S. Cl.** **463/36**

(57) **ABSTRACT**

Systems, methods, and products for self-contained casino gaming haptics are disclosed. For example, one disclosed system for casino gaming haptics includes a touch-sensitive input device configured to sense a contact from a user; an actuator coupled to the touch-sensitive input device, the actuator configured to output a haptic effect to the touch-sensitive input device; and a processor in communication with the touch-sensitive input device and the actuator, the processor configured to: generate a display signal configured to cause an image associated with a casino game to be displayed; receive an input signal from the touch-sensitive input device associated with the contact; determine an interaction between the contact and the image; and generate an actuator signal associated with the interaction, the actuator signal configured to cause the actuator to generate a haptic effect.



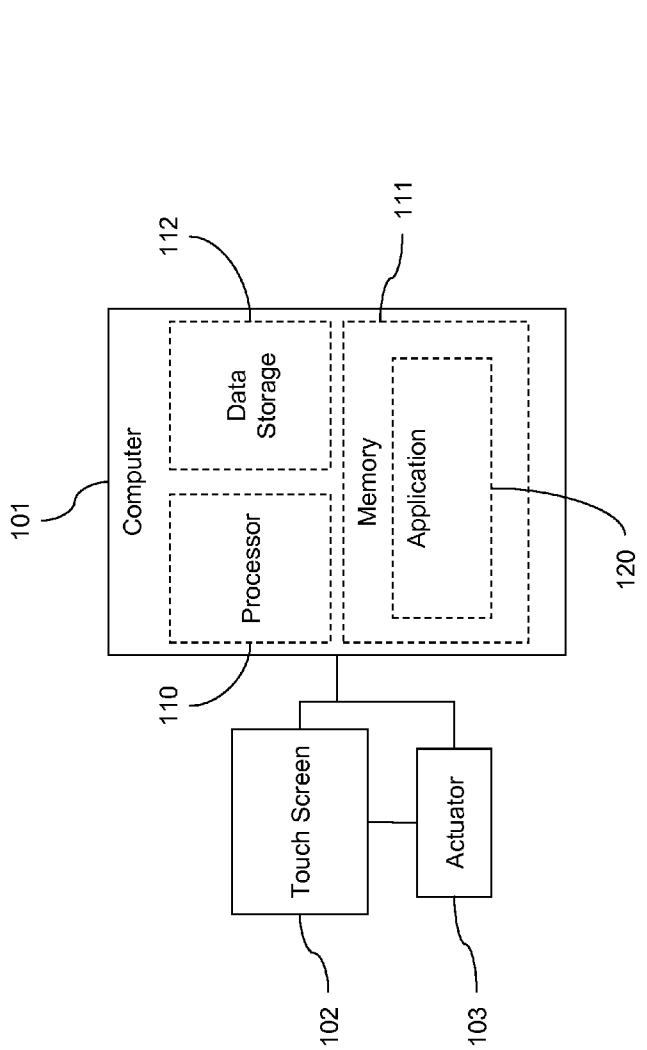

100
112
111
Data Storage
Computer
Memory
Application
101
Processor
120
110
Touch Screen
Actuator
102
103

Figure 1

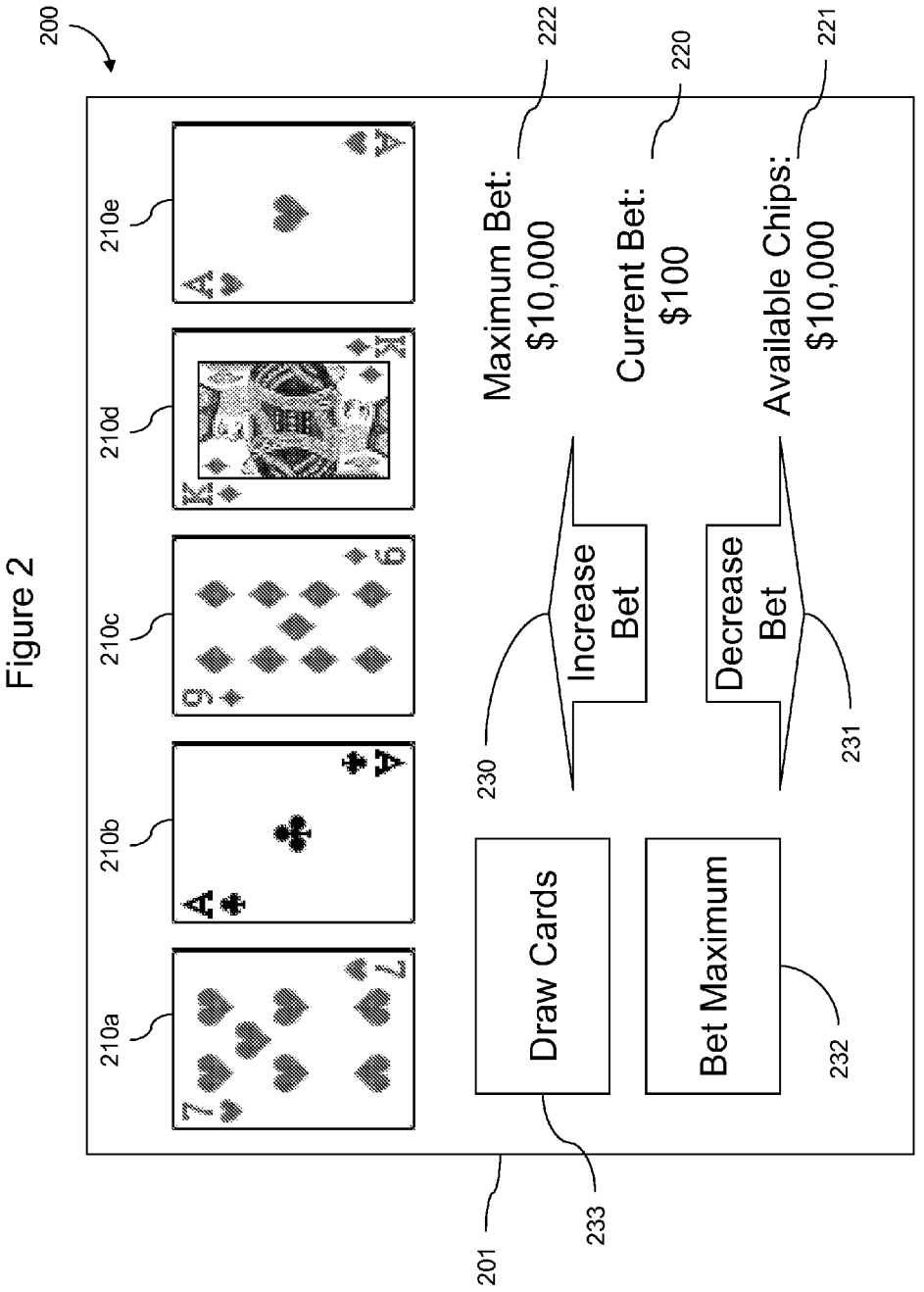

200
210a
210b
210c
210d
210e
Maximum Bet:
$10,000
Current Bet:
$100
Available Chips:
$10,000
222
220
221
Increase Bet
Decrease Bet
230
231
Draw Cards
Bet Maximum
232
233
201

Figure 2

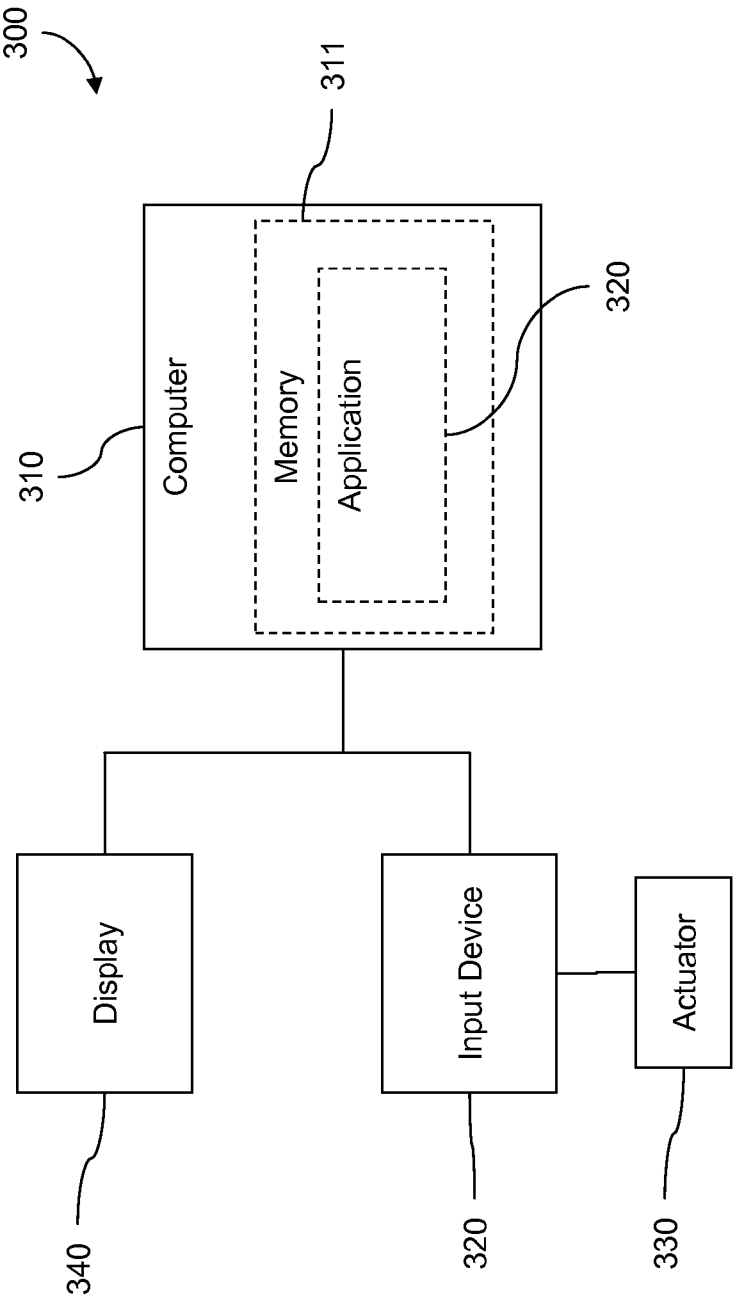

300
311
320
310
Computer
Memory
Application
Display
Input Device
Actuator
340
320
330

Figure 3

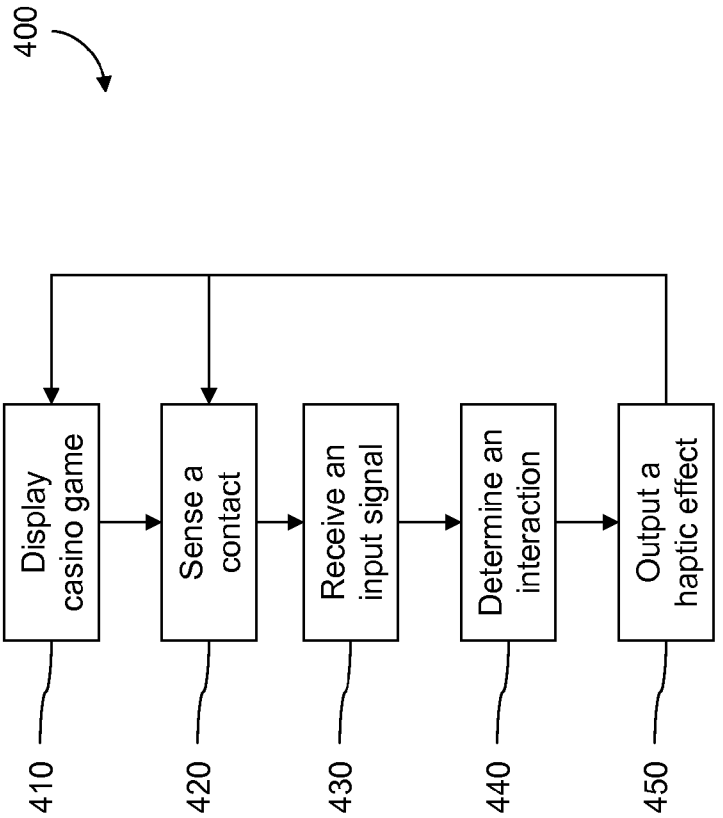

400
Display casino game
Sense a contact
Receive an input signal
Determine an interaction
Output a haptic effect
410
420
430
440
450

Figure 4

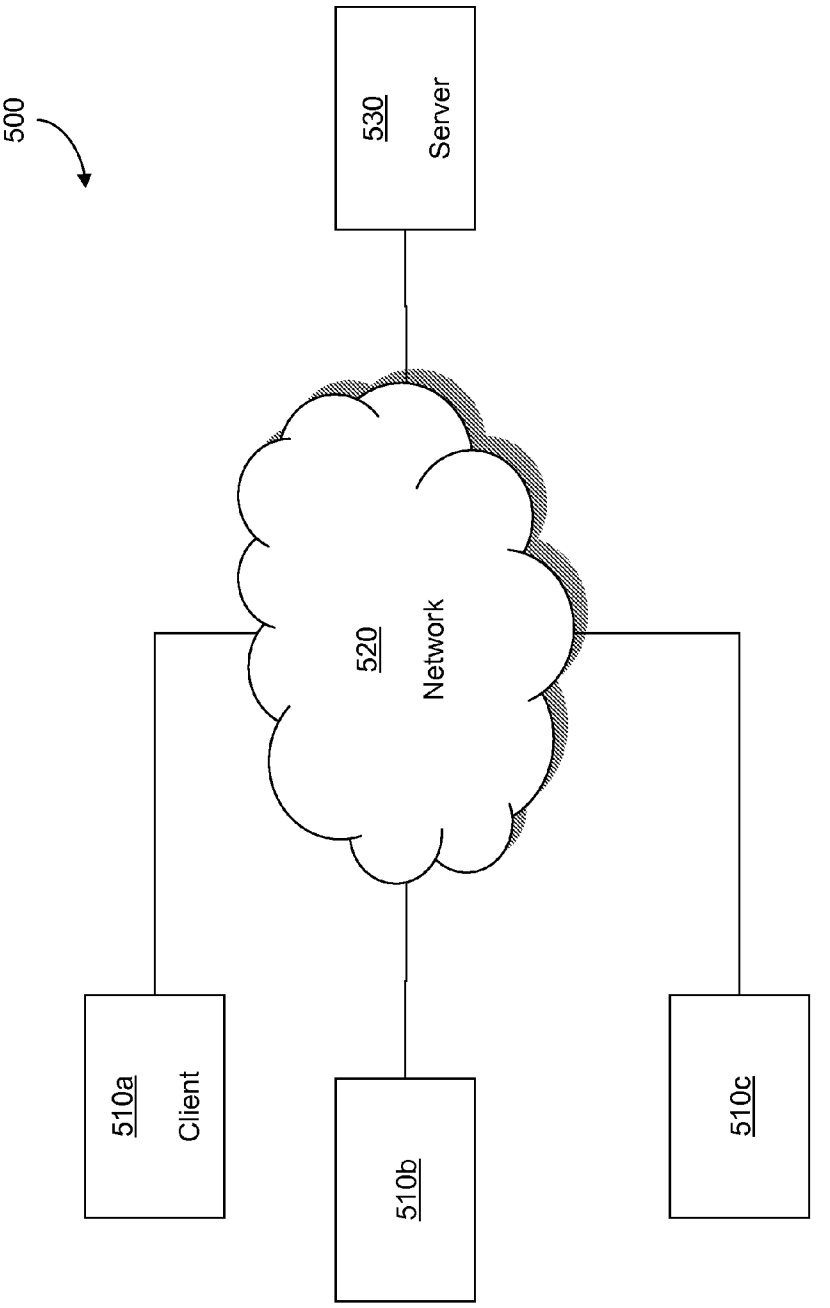


Figure 5

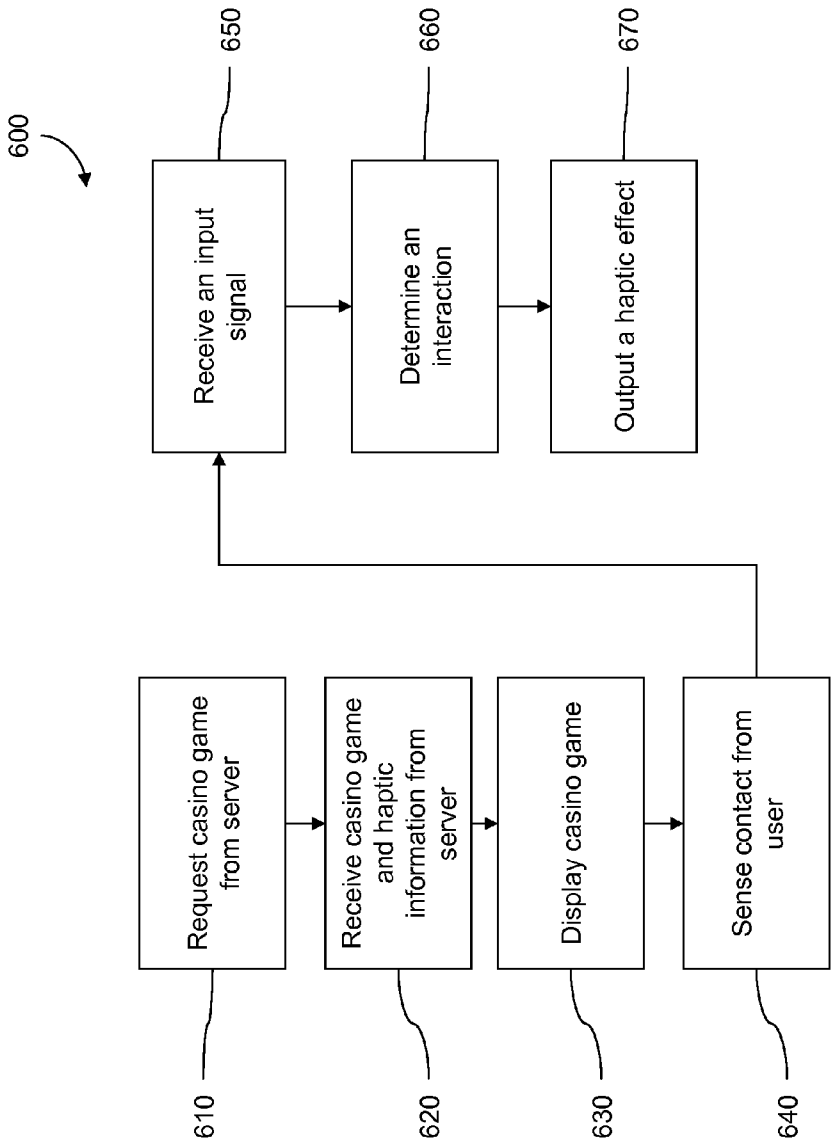

600
650
660
670
Receive an input signal
Determine an interaction
Output a haptic effect
Request casino game from server
Receive casino game and haptic information from server
Display casino game
Sense contact from user
610
620
630
640

Figure 6

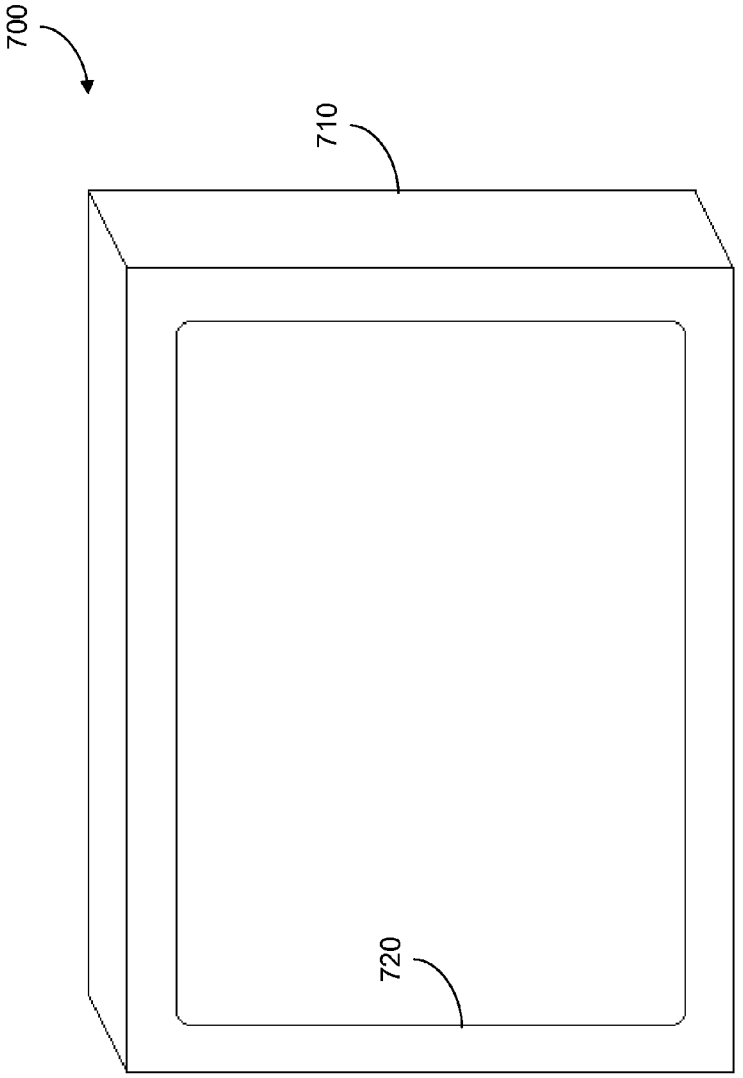


Figure 7

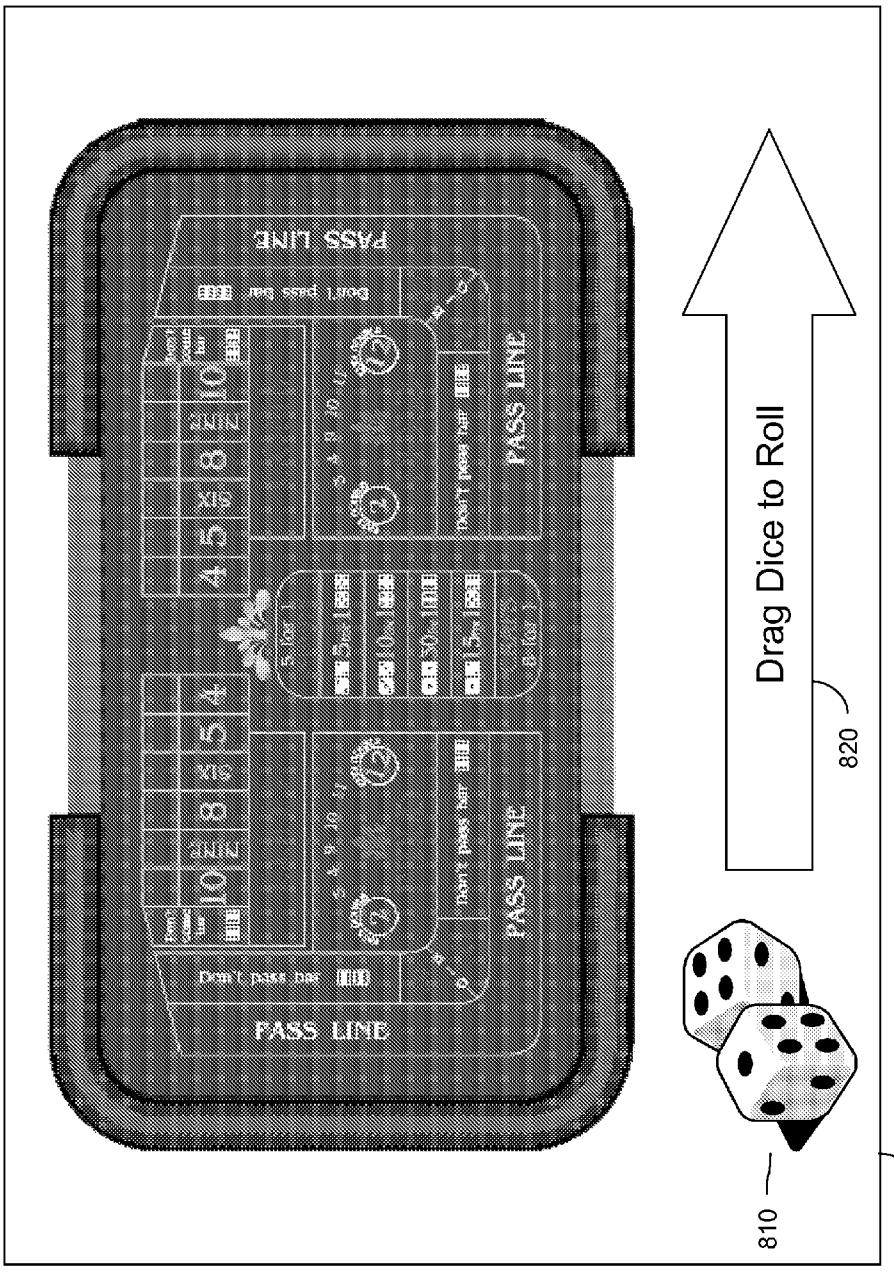

PASS LINE
PASS LINE
PASS LINE
PASS LINE
Drag Dice to Roll
820
810
800

Figure 8

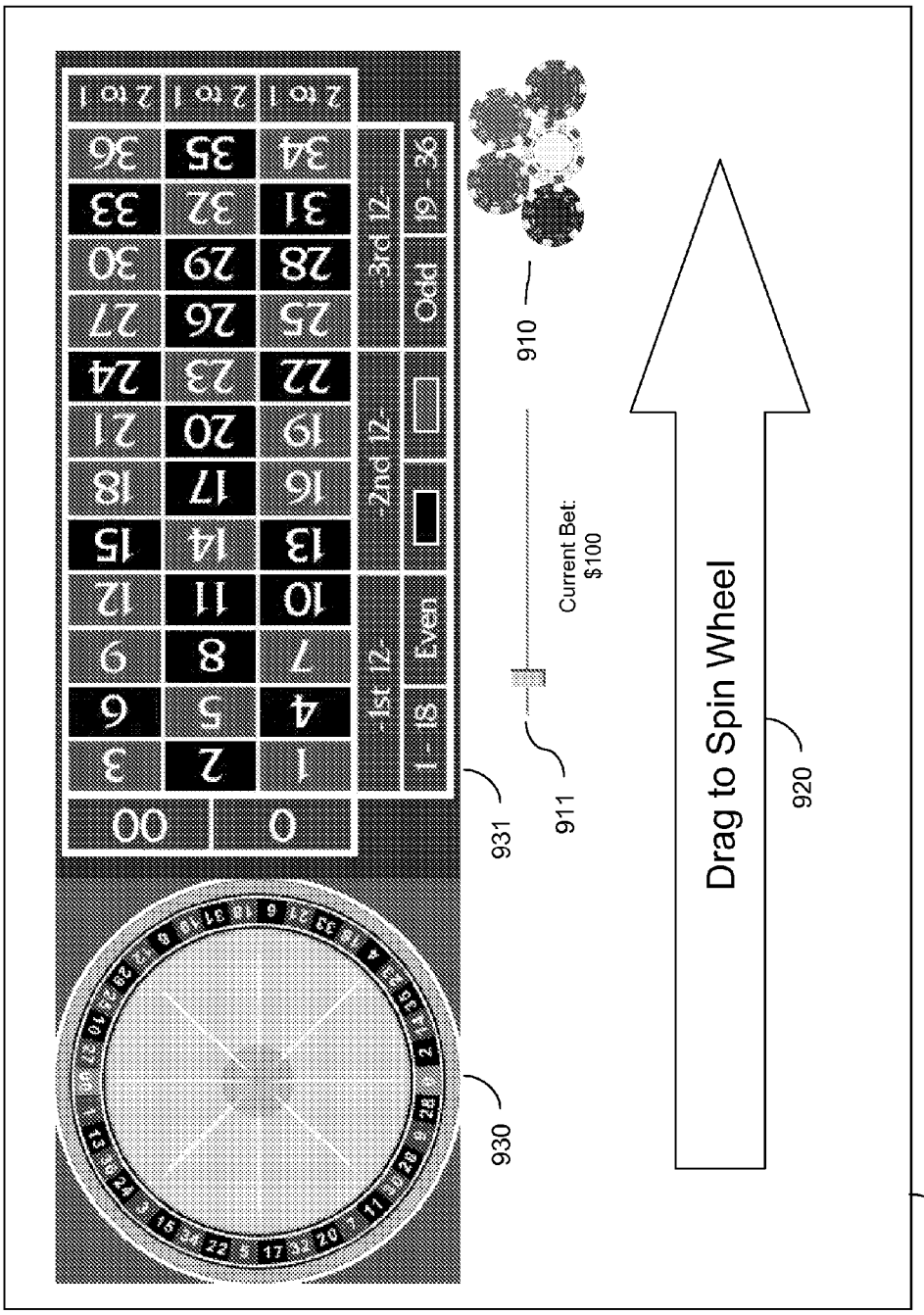

2 to 1
2 to 1
2 to 1
34
35
36
31
32
33
28
29
30
25
26
27
22
23
24
19
20
21
16
17
18
13
14
15
10
11
12
7
8
9
4
5
6
1
2
3
0
00
1st 12
2nd 12
3rd 12
1 - 18
Even
19 - 36
Odd
910
911
931
930
Current Bet:
$100
Drag to Spin Wheel
920
900

Figure 9

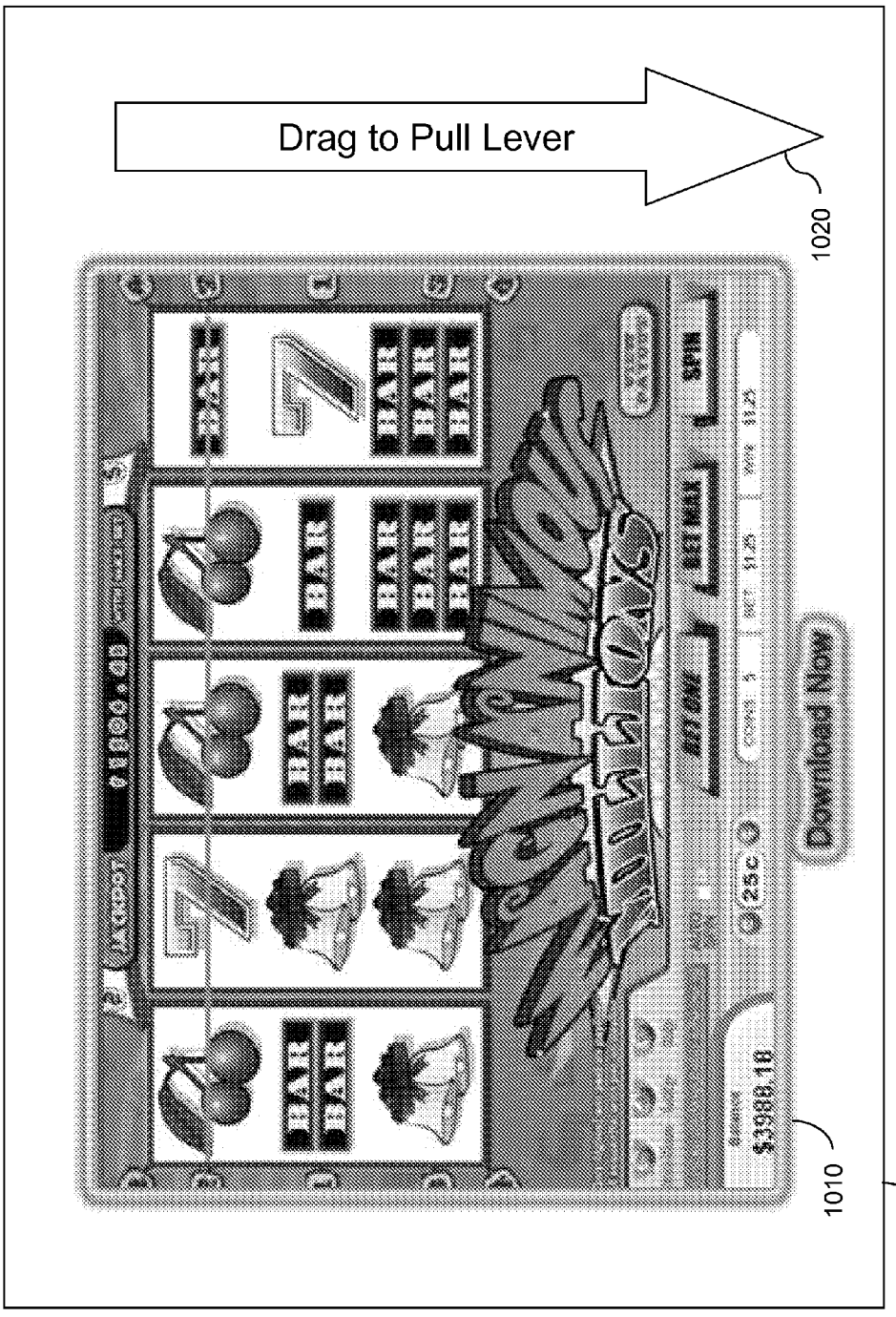


Figure 10

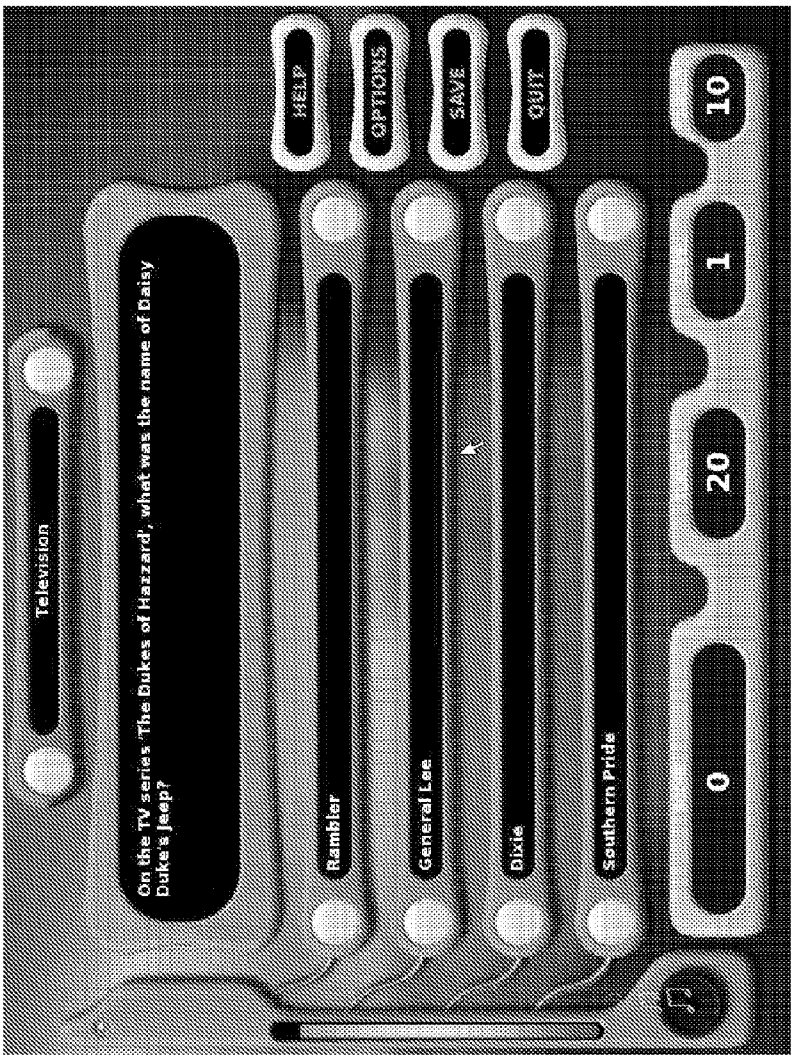

Television
On the TV series 'The Dukes of Hazzard', what was the name of Daisy Duke's Jeep?
Rambler
General Lee
Dixie
Southern Pride
HELP
OPTIONS
SAVE
QUIT
0
20
1
10

Figure 11

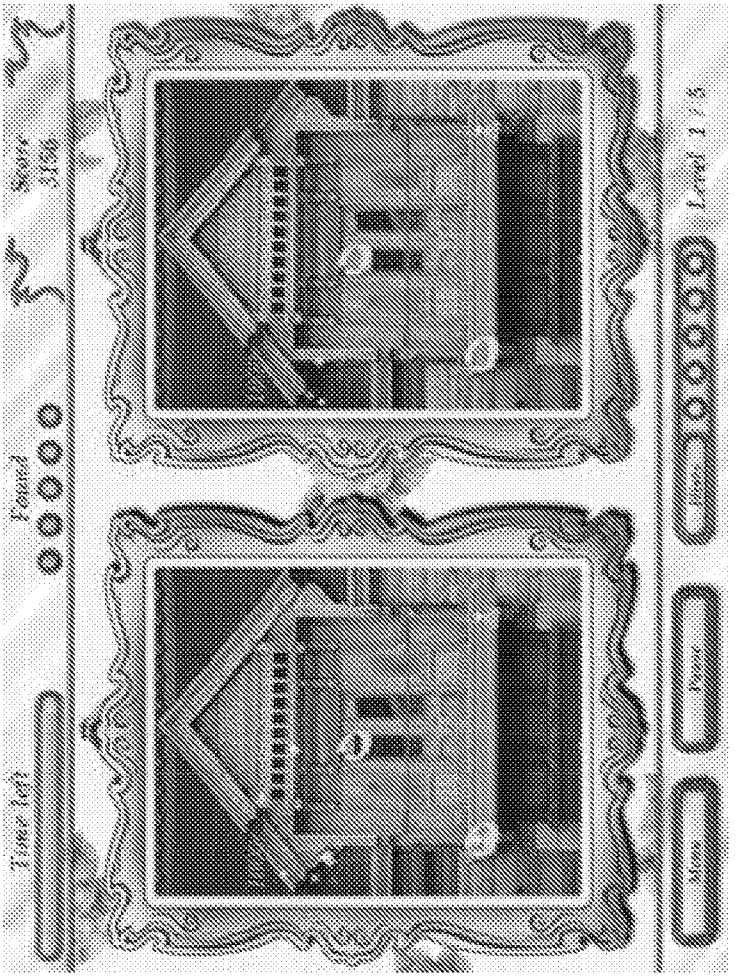


Figure 12

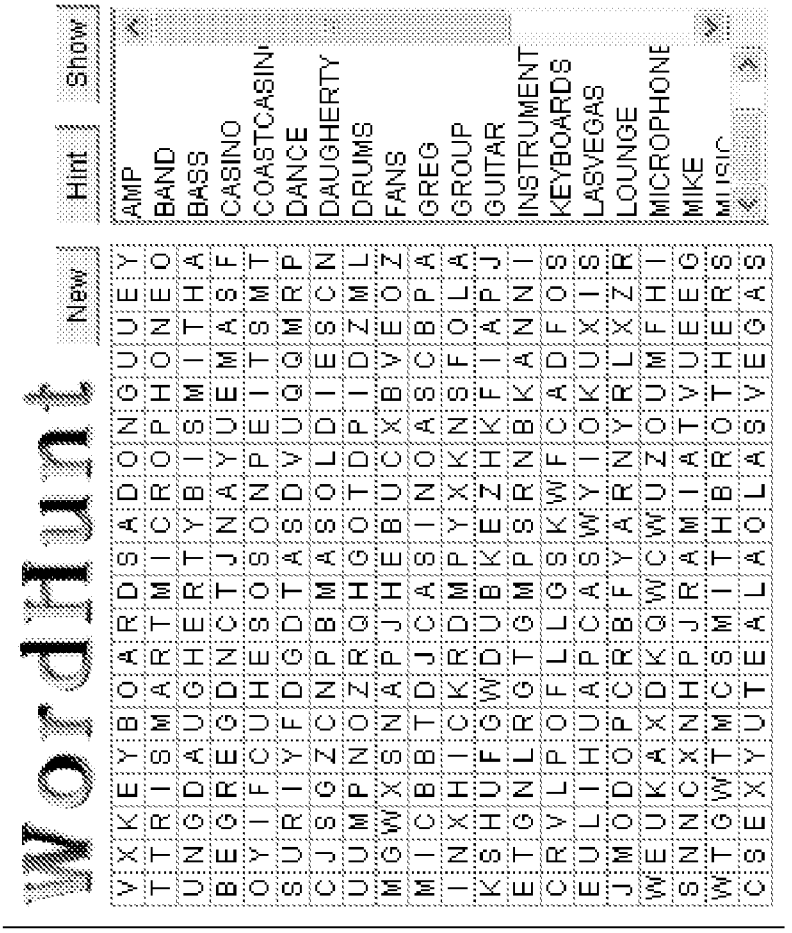

Wordhunt
New
Hint
Show
AMP
BAND
BASS
CASINO
COASTCASIN
DANCE
DAUGHERTY
DRUMS
FANS
GREG
GROUP
GUITAR
INSTRUMENT
KEYBOARDS
LASVEGAS
LOUNGE
MICROPHONE
MIKE

Figure 13

Figure 14

SYSTEMS AND METHODS FOR CASINO GAMING HAPTICS

CROSS-REFERENCES TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Patent Application No. 60/844,316 entitled "Casino Gaming Haptics," filed Sep. 13, 2006, the entirety of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention generally relates to haptic gaming devices. The present invention more specifically relates to systems and methods for casino gaming haptics.

BACKGROUND

[0003] Guests at a casino are typically able to play electronic casino games, such as video poker games. The electronic game presents a user with an image showing a poker hand, for example. The user is able to bet chips, select cards to discard, and to draw additional cards. The game then awards credits to the user based on the strength of the user's hand. Other games of chance may be played on similar machines, such as other card games, dice games, slot machines, roulette, or other virtual gaming implements. For example, a video slot machine may allow a user to select a number of rows to bet, a number of credits to wager, and pull a virtual lever to start the random selection of icons to be displayed in three windows. When the wheels have come to a rest, the user may be awarded credits based upon the combination of icons presented in the windows.

[0004] While conventional casino gaming machines may provide feedback to a user in the form of visual displays on a screen, or with sounds, conventional casino gaming machines do not provide haptic feedback to a user. Such feedback may provide a more immersive or enjoyable gaming experience, and may encourage the user to play a haptically-enabled game machine instead of a conventional game machine.

SUMMARY

[0005] Embodiments of the present invention comprise systems and methods for casino gaming haptics. For example, in one embodiment, a system for casino gaming haptics comprises a touch-sensitive input device configured to sense a contact from a user; an actuator coupled to the touch-sensitive input device, the actuator configured to output a haptic effect to the touch-sensitive input device; and a processor in communication with the touch-sensitive input device and the actuator, the processor configured to: generate a display signal configured to cause an image associated with a casino game to be displayed; receive an input signal from the touch-sensitive input device associated with the contact; determine an interaction between the contact and the image; and generate an actuator signal associated with the interaction, the actuator signal configured to cause the actuator to generate a haptic effect. In another embodiment, a computer-readable media comprises code for a carrying out such a method.

[0006] These illustrative embodiments are mentioned not to limit or define the invention, but to provide examples to aid understanding thereof. Illustrative embodiments are discussed in the Detailed Description, and further description of the invention is provided there. Advantages offered by various embodiments of this invention may be further understood by examining this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] These and other features, aspects, and advantages of the present invention are better understood when the following Detailed Description is read with reference to the accompanying drawings, wherein:

[0008] FIG. **1** is a block diagram illustrating a system for casino gaming haptics according to one embodiment of the present invention;

[0009] FIG. **2** is a simulated screenshot of images associated with a casino game application executed by a system for casino gaming haptics according to one embodiment of the present invention;

[0010] FIG. **3** is a block diagram illustrating a system for casino gaming haptics according to one embodiment of the present invention;

[0011] FIG. **4** is a flow chart illustrating a method for providing casino gaming haptics according to one embodiment of the present invention;

[0012] FIG. **5** is a block diagram illustrating a system for casino gaming haptics according to one embodiment of the present invention;

[0013] FIG. **6** is a flow chart illustrating a method for providing casino gaming haptics according to one embodiment of the present invention;

[0014] FIG. **7** shows a system **700** for self-contained casino-gaming haptics according to one embodiment of the present invention;

[0015] FIGS. **8-10** are simulated screenshots of images associated with a casino gaming application executed by a system for casino gaming haptics according to one embodiment of the present invention; and

[0016] FIGS. **11-14** show games according to various embodiments of the present invention.

DETAILED DESCRIPTION

[0017] Embodiments of the present invention provide systems and methods for casino gaming haptics. Methods, systems and products according to the present invention may be embodied in a number of ways.

Illustrative Casino Gaming Haptics

[0018] FIG. **1** is a block diagram illustrating a system for casino gaming haptics according to one embodiment of the present invention. In the illustrative embodiment shown in FIG. **1**, a system **100** for casino gaming haptics comprises a computer **101**, a touch screen **102**, and an actuator **103** in communication with the computer **101** and the touch screen **102**. Computer **101** also comprises a computer-readable medium, such as a memory **111**. Computer **101** comprises a processor **110** configured to load an application **120** from storage **112** into memory **111**. In this illustrative embodiment, application **120** is a casino gaming application configured to allow a user to play five-card draw poker.

[0019] FIG. **2** is a simulated screenshot of images associated with a casino game application executed by a system for casino gaming haptics according to one embodiment of the present invention. The embodiment shown in FIG. **2** will be described in relation to the system shown in FIG. **1**. The touch screen **102** displays the five-card draw poker game **201** as shown in FIG. **2**. The game **201** shows the five cards **210***a-e* dealt to the player, the current bet **220**, the number of chips **221** the player has, buttons **230**, **231** to allow the user to increase or decrease the wager, a button **232** to place the maximum wager **222**, and a button **233** to draw cards to replace any the player wishes to discard. A user may select one or more cards **210***a-e* to keep or to discard, or interact with one or more of the buttons **230-233** to play the game **201**. For example, the player may choose to discard the seven of hearts **210***a* and nine of diamonds **210***c* by touching the cards on the touch screen **102**. The user may then increase his bet by pressing the "Increase Bet" button **230**, and draw two new cards by pressing button **233**.

[0020] In the embodiment shown, as the player interacts with the touch screen **102**, such as to select cards **230***a-e* to discard, change the bet **230-232**, or to choose to draw new cards **233**, the system **100** provides haptic feedback to the player. The actuator **103** is in communication with the touch screen **102** and may be commanded by the computer **101** to output haptic effects to the touch screen **102**. For example, when the player touches a card **230***a* to be discarded, the actuator **103** may generate a haptic effect, such as a short duration high frequency vibration (which may be referred to as a "pop"), to indicate that the card **230***a* has been selected. Pops and other well-known haptic effects will not be described in detail as they are known to one of ordinary skill in the art. The actuator **103** may also output haptic effects corresponding to other actions, such as betting changes, or when the player chooses to draw cards.

[0021] Additionally, the system **100** may output haptic effects in response to events that occur in the game. For example, the system may output a haptic effect when new cards are dealt, or if the player has the winning hand.

[0022] This illustrative example is given to introduce the reader to the general subject matter discussed herein. The invention is not limited to this example. Further details regarding various embodiments of systems and methods for casino gaming haptics are described below.

System for Casino Gaming Haptics

[0023] FIG. **3** is a block diagram illustrating a system **300** for casino gaming haptics according to one embodiment of the present invention. In the embodiment shown in FIG. **3**, system **300** comprises a computer **310** or other processor-based device, a touch-sensitive input device **320** in communication with the computer **310** and an actuator **330**, and a display **340** in communication with the computer **310**.

[0024] Computer **310** comprises a processor (not shown), memory **311**, or other computer-readable medium, and is configured to load application **312** from storage, such as from a hard drive or other computer-readable medium, and execute application **312**. Computer **310** is in communication with an input device **320**, an actuator **330**, and a display **340**, and is configured to generate a display signal configured to cause an image associated with a casino game to be displayed, and to transmit the display signal to display device **340**. The computer **310** is further configured to receive an input signal from the touch-sensitive input device **320**, such as from a user making contact with the touch-sensitive input device, and to determine an interaction between the contact and the image.

[0025] For example, in one embodiment of the present invention, a casino game, such as can be seen in FIG. **2**, may be displayed by display **340**. A user may touch a touch-sensitive input device, such as a touch screen **320**, at a location to indicate that a card should be selected. The computer **310** receives an input signal from the touch-screen **320**. The input signal indicates that the user has touched the touch screen **320**. In one embodiment of the present invention, the input signal comprises a coordinate describing the location of the contact. The computer **310** then determines an interaction between the contact and the image. For example, in one embodiment of the present invention, the computer **310** determines whether the location of the contact falls within the boundaries of an object displayed on the screen, such as a playing card.

[0026] Computer **310** is further configured to generate an actuator signal associated with the interaction, the actuator signal configured to cause the actuator **330** to generate a haptic effect. For example, in one embodiment of the present invention, a user may contact the touch screen **320** at a location corresponding to a playing card. The computer **310** determines there is an interaction between the contact and the image of the playing card. The computer **310** then generates a haptic effect, such as a vibration, and encodes the haptic effect within an actuator signal. The computer **310** then transmits the actuator signal. For example, in one embodiment of the present invention, the computer **310** transmits the actuator signal to the input device **320**. In such an embodiment, the input device **320** may then send a signal to the actuator **330** to generate the haptic effect. In one embodiment of the present invention, the computer **310** transmits the actuator signal directly to the actuator **330**.

[0027] In the embodiment shown in FIG. **3**, input device **320** comprises a touch-sensitive input device configured to sense a contact from a user. For example, in one embodiment, input device **320** comprises a touch screen. In the embodiment shown in FIG. **3**, the touch screen comprises the display **340** and the touch-sensitive input device **320** which is overlaid on the display **340**. In other embodiments of the present invention, the touch-sensitive input device **320** may not be overlaid on the display **340**. In one embodiment of the present invention, input device **320** comprises a non-touch-sensitive input device, such as a keyboard or keypad. Other embodiments of the present invention may comprise other non-touch-sensitive input devices such as buttons, knobs, dials, switches, levers, trackballs, or other suitable manipulanda. For example, an embodiment of the present invention for playing a slot machine may comprise a lever.

[0028] The actuator **330** shown in FIG. **3** is in communication with the input device **320** and computer **310**. In one embodiment, the actuator **330** may be in communication with a housing a device and may be configured to output haptic effects to the housing as well as the input device. Any suitable actuator may be used in embodiments of the present invention. Further embodiments of the present invention

may comprise a plurality of actuators. In various embodiments of the present invention, actuators can comprise either active or passive actuators.

[0029] Active actuators include, for example, linear current control motors, stepper motors, pneumatic/hydraulic active actuators, piezoelectric actuators, eccentric rotating masses, and other types of actuators that transmit a force to move an object or to provide a vibrotactile effect. For example, active actuators can drive a rotational shaft about an axis in a rotary degree of freedom, or drive a linear shaft along a linear degree of freedom. Active transducers of embodiments of the present invention may be bi-directional, meaning they can selectively transmit force along either direction of a degree of freedom. For example, DC servo motors can receive force control signals to control the direction and torque (force output) that is produced on a shaft. The motors may also include one or more brakes which allow the rotation of the shaft to be halted in a short span of time. Other types of active motors can also be used, such as a stepper motor controlled with pulse width modulation of an applied voltage, pneumatic/hydraulic actuators, a torquer (motor with limited angular range), a voice coil actuator, or other active actuators known to those skilled in the art. Alternatively, or in addition, other active actuators such as piezo-electric, shape memory alloy, or electro-active polymers may be used as well.

[0030] Passive actuators can also be used for actuator **330**. Magnetic particle brakes, friction brakes, or pneumatic/hydraulic passive actuators can be used in addition to or instead of an active actuator to generate a damping resistance, a vibrotactile effect, or friction in a degree of motion.

[0031] In some embodiments of the present invention, an input device **320** may integrally incorporate an actuator within the input device **320**. Such an input device **320** may comprise one or more actuators configured to output haptic effects. Such input devices are referred to herein as "haptically-enabled." In some embodiments of the present invention, an input device **320** may not comprise an actuator. In such an embodiment, haptic effects maybe output to the input device **320** indirectly, such as by an actuator in communication with a housing of the input device.

[0032] Display **340** comprises a device capable of receiving a display signal from a computer or processor-based device and displaying an image to a user. For example, in one embodiment of the present invention, display **340** comprises a liquid-crystal display (LCD). In one embodiment of the present invention, display comprises **340** a cathode-ray tube (CRT) monitor or an organic light-emitting diode (OLED) display. In some embodiments of the present invention, display **340** may comprise a plurality of displays. For example, in one embodiment of the present invention, a system for casino gaming haptics comprises a slot machine. In such an embodiment, display **340** may comprise three displays, where each display simulates one of the three wheels of a conventional slot machine.

[0033] FIG. **4** shows a method **400** for providing casino gaming haptics according to one embodiment of the present invention. The description of the method **400** will be made with reference to the system **300** shown in FIG. **3**.

[0034] In block **410**, a system **300** displays an image associated with a casino game. For example, in one embodiment of the present invention, system **300** displays an image associated with a casino game on display **340**. In another embodiment of the present invention, a system for casino gaming haptics transmits a signal to a remote device to cause the device to display an image associated with casino game. For example, a server may transmit a signal to a remote computer to cause the remote computer to display an image associated with a casino game.

[0035] In block **420**, a touch-sensitive input device **320** senses a contact with the touch-sensitive input device **320**, the contact associated with the image or a portion of the image. For example, in one embodiment of the present invention, a user contacts a touchscreen at a location associated with a displayed playing card, and the touchscreen senses the contact.

[0036] In block **430**, a computer **310** receives an input signal from the touch-sensitive input device **320**, the input signal associated with the contact. For example, in one embodiment of the present invention, after the touch-sensitive input device **320** senses a location of a contact, the touch-sensitive input device **320** transmits a signal to the computer **310**, which receives the input signal from the touch-sensitive device **320**, the input signal associated with the contact.

[0037] In block **440**, the system **300** determines an interaction between the contact and the image. For example, in one embodiment of the present invention, the computer **310**, compares the location of the contact with the location of an image of the playing card displayed on the display **340**. If the location of the contact overlaps with the location of the image, or contacts or is within a boundary of the image, the system **300** determines that the contact interacted with the image. A user may contact a location of an image in different ways. For example, in one embodiment of the present invention, the system **300** may determine that a user has touched the image. In one embodiment of the present invention the system **300** may determine that the user has slid a finger across the image, tapped the image, or has flipped the image over.

[0038] In block **450**, the system **300** outputs a haptic effect based at least in part on the interaction. For example, in one embodiment of the present invention, the computer **310** transmits an actuator signal to the actuator **330**, the actuator signal configured to cause the actuator to output a haptic effect. In another embodiment of the present invention, the computer **310** transmits an actuator signal to the input device **320**. The input device **320** then causes the actuator to output a haptic effect.

[0039] Referring now to FIG. **5**, FIG. **5** is a block diagram illustrating a system for casino gaming haptics according to one embodiment of the present invention. The networked system **500** comprises a plurality of client systems **510**, a network **520**, and at least one server **530**. Client systems are in communication with the network and server. In addition, clients **510** may be in communication with each other.

[0040] In the embodiment shown in FIG. **5**, server **530** comprises a computer or other processor-based device. The server **530** further comprises a computer-readable medium, such as a hard drive, on which is stored one or more casino game applications. Server **530** is configured to communicate with one or more client systems **510** over network **520**.

[0041] In the embodiment shown in FIG. **5**, client systems **510** each comprise a system, such as system **300** shown in FIG. **3**. However, in other embodiments of the present invention, client systems **510***a-c* may comprise other computer systems. For example, in one embodiment of the present invention client system **510***a* comprises a thin client device. A thin client device comprises an input device, such as a touchscreen, a processor, a network interface, and a computer-readable medium. For example, in one embodiment, thin client device may comprise an integral unit having a housing, a touchscreen, a processor, a computer-readable memory, and an interface for communication with the network **520**. The input device is in communication with an actuator configured to output haptic effects to the input device. While a thin client device comprises a computer-readable medium, it may or may not have a non-volatile computer-readable medium, such as a hard drive. Such a thin client device may be configured to communicate with the server **530** to download a casino gaming application stored on the server **530** into the thin client's computer-readable medium, such as RAM. In addition, the thin client device may be able to download haptic effect information. For example, the thin client may download an application to allow a user to play craps. The thin client may also download haptic information that includes data for generating haptic effects, such as for shaking and rolling dice.

[0042] Once the application and the haptic information have been downloaded, the thin client device may allow a user to play one or more haptic casino games. Such an embodiment may allow a casino or other establishment to install a plurality of relatively inexpensive thin client devices on its premises, and use a fewer number of servers **530**, which are typically more expensive.

[0043] Embodiments of the present invention may comprise a network **520**. Any suitable network may be employed that will allow data transfer between a client **510** and a server **530**. Some embodiments of the present invention may allow two clients **510** to communicate, such as to play an interactive casino game with users at other clients **510**, like poker. A suitable network may comprise any suitable communications link, including a circuit; Ethernet; a token ring network; a wireless communications link including but not limited to 802.11 wireless Ethernet, Bluetooth; a system bus; USB; or FireWire.

[0044] Referring now to FIG. **6**, which shows a method **600** for casino gaming haptics according to one embodiment of the present invention. The description of the method **600** will be made with reference to the system **500** shown in FIG. **5**.

[0045] In block **610**, a client **510** requests a casino game from a server **530**. For example, in one embodiment of the present invention, a client **510** may comprise a thin client. The client **510** may transmit a request over a network **520** to the server **530**, where the request specifies a game a user has selected to play. In another embodiment, the client **510** may transmit a request over a network **520** to the server **530**, where the request is sent after the client **510** powers up, and specifies one or more games the client **510** is authorized to play.

[0046] In response to the request sent in block **610**, the server **530** determines if the requested application or applications are available. The server may also require authentication from the client device, such as an access code, a password, or other identification or authentication device in order to prevent unauthorized access to the server or the applications. If the requested applications are available, the server **530** transmits the requested applications to the client **510**.

[0047] In addition to transmitting a request for a casino game application, the client **510** may transmit a request for haptic information. For example, in one embodiment of the present invention, the client **510** may request haptic information associated with the casino game application.

[0048] In one embodiment of the present invention, a plurality of clients **510** may be in communication and allow multiple users to participate in the same game, such as in a multiplayer poker game. In such an embodiment, server **502** may receive signals or messages from one or more clients **510**, and may transmit signals or messages to one or more clients **510** indicating actions of the plurality of users or one or more haptic effects based on the actions of the plurality of users.

[0049] In block **620**, the client **510** receives a casino game application from the server **530**. After the client **510** has received the casino game application (or the "application"), the client **510** may execute the application. In one embodiment, the client **510** may receive a plurality of casino game applications. In such an embodiment, the client **510** may execute one of the applications, or it may allow a user to select one of the applications to execute.

[0050] In block **630**, the client **510** displays an image associated with the casino game application. For example, in one embodiment of the present invention, a casino game application may comprise a poker game. In such an embodiment, the casino game application may display a plurality of images, such as may be seen in FIG. **2**.

[0051] In block **640**, a touch-sensitive input device senses a contact client, the contact associated with the image. For example, in one embodiment of the present invention, a user contacts a touchscreen at a location associated with a displayed playing card, and the touchscreen senses the contact.

[0052] In block **650**, the client **510** receives an input signal from the touch-sensitive input device, the input signal associated with the contact. For example, in one embodiment of the present invention, after the touch-sensitive input device senses a contact, the touch-sensitive input device transmits a signal to the client **510**, which receives the input signal from the touch-sensitive device, the input signal associated with the contact.

[0053] In block **660**, the client **510** determines an interaction between the contact and the image. For example, in one embodiment of the present invention, the client **510**, compares a location of the contact with the location of an image of a playing card displayed on the client's display. If the location of the contact falls within the boundary of the image, the client determines that the contact interacted with the image.

[0054] In block **670**, the client **510** outputs a haptic effect based at least in past on the interaction. For example, in one embodiment of the present invention, the client **510** transmits an actuator signal to an actuator, the actuator signal

configured to cause the actuator to output a haptic effect. In one embodiment of the present invention, the client **510** transmits an actuator signal to the touch-sensitive input device. The touch-sensitive input device then causes the actuator to output a haptic effect. In another embodiment of the present invention, the client **510** may transmit the actuator signal directly to an actuator.

[**0055**] FIG. **7** shows a system **700** for self-contained casino-gaming haptics according to one embodiment of the present invention. The system **700** comprises a self-contained casino gaming system. The system comprises a housing **710** and a touch screen **720**. The system **700** also comprises a processor (not shown, an actuator (not shown) in communication with the touch screen, and a memory (not shown). The system **700** is configured to execute an application which comprises a casino game, such as, without limitation, poker. The processor generates a display signal associated with the casino game and transmits it to the touch screen **720**. The touch screen **720** displays the game to the user, and accepts inputs from the user via user contact with the touch screen **720**. The touch screen **720** transmits an input signal to the processor, which determines an interaction between the contact and an image displayed on the touch screen **720**. The processor generates and transmits an actuator signal associated with the interaction. The actuator receives the actuator signal and outputs a haptic effect to the touch screen.

[**0056**] Referring again to FIGS. **3** and **7**, embodiments of the present invention can be implemented in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations of them. In one embodiment, a computer may comprise a processor or processors. The processor comprises a computer-readable medium, such as a random access memory (RAM) coupled to the processor. The processor executes computer-executable program instructions stored in memory, such as executing one or more computer programs for editing an image. Such processors may comprise a microprocessor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), field programmable gate arrays (FPGAs), and state machines. Such processors may further comprise programmable electronic devices such as PLCs, programmable interrupt controllers (PICs), programmable logic devices (PLDs), programmable read-only memories (PROMs), electronically programmable read-only memories (EPROMs or EEPROMs), or other similar devices.

[**0057**] Such processors may comprise, or may be in communication with, media, for example computer-readable media, that may store instructions that, when executed by the processor, can cause the processor to perform the steps described herein as carried out, or assisted, by a processor. Embodiments of computer-readable media may comprise, but are not limited to, an electronic, optical, magnetic, or other storage or transmission device capable of providing a processor, such as the processor in a web server, with computer-readable instructions. Other examples of media comprise, but are not limited to, a floppy disk, CD-ROM, magnetic disk, memory chip, ROM, RAM, ASIC, configured processor, all optical media, all magnetic tape or other magnetic media, or any other medium from which a computer processor can read. Also, various other devices may include, such as a router, private or public network, or other transmission device. The processor, and the processing, described may be in one or more structures, and may be dispersed through one or more structures. The processor may comprise code for carrying out one or more of the methods (or parts of methods) described herein.

Games and Haptic Effects

[**0058**] Systems for casino gaming haptics according to embodiments of the present invention may be configured to provide one or more games for a user to play. For example, systems for casino gaming haptics may be configured to provide card games, dice games, roulette, checkers, Othello™-type games, picture match games, word games, trivia games, or other games conventionally available in casino gaming machines, or similar machines that may be commonly found in bars or other establishments.

[**0059**] A system for casino gaming haptics according to one embodiment of the present invention may be configured to provide haptic effects for events or options that may occur within a game. For example, in a system for casino gaming haptics according to one embodiment of the present invention that provides a roulette game, the system may be capable of generating haptic effects associated with events or actions that may occur in a conventional roulette game or electronic roulette game, such as spinning the roulette wheel, a roulette ball moving or bouncing within the roulette wheel, betting chips, pressing interface buttons, or moving chips across a felt surface. In one embodiment of the present invention, a casino gaming system may be configured to provide haptic effects for other games, such as placing bets on a virtual craps table, arranging cards on a Pai-Gow poker game, game selection for multi-game devices, selecting position and color for checkers and Othello™-type casino games, or choosing objects in bonus games, or playing other types of casino games, such as baccarat, craps, war, keno, blackjack, or slots.

[**0060**] Additionally, a system for casino gaming haptics according to the present invention may be capable of generating haptic effects associated with actions and events common to a plurality of games. For example, in one embodiment of the present invention, a system for casino gaming haptics may be capable of generating haptic effects corresponding to pressing a button, winning a game, losing a game, receiving chips, beginning a game, quitting a game, or other events common to two or more games.

[**0061**] Embodiments of the present invention provide haptic effects for actions a user may take during a game. For example, embodiments of the invention may allow a user to roll dice, deal or move playing cards, spin a roulette wheel, play a slot machine, or otherwise interact with objects associated with casino games. Such haptic effects may be employed to provide a more realistic experience for the user.

Haptic Effects Associated with Virtual Cards

[**0062**] Many casino games involve playing cards, including poker and blackjack. Card games may include actions such as dealing one or more cards to each player, selecting one or more cards within the player's hand, and discarding cards. Various haptic effects may be employed to provide feedback to a player interacting with a playing card. For example, in one embodiment of the present invention, if a player touches a touch screen and drags his finger towards a card, the system may generate a short, low magnitude, high

frequency haptic effect when the user's finger passes over the edge of a playing card. The system may also play a continuous low magnitude, high frequency haptic effect as long as the player's finger is located over the playing card.

[0063] In addition to touching a card, a user may slide a playing card, such as to re-arrange the cards in the user's hand, or to discard the card. While the user is sliding the card, the system may provide a higher magnitude vibration to the user, to indicate that the card is being moved. Once the card has reached a potential destination, which may be denoted by an outline on the screen, the system may generate a high magnitude, high frequency effect to indicate to the user that the card may be released.

[0064] For example, in the embodiment shown in FIGS. **1** and **2**, a user may touch the nine of diamonds **210***c*, and feel a light pop (e.g. a low magnitude, high frequency, short duration effect) to indicate that the card has been contacted. The user may then drag the card **210***c* to the edge of the screen **201** to discard the card. While the user is dragging the card, the system **100** may output a low magnitude, low frequency vibration to provide the tactile sensation of a card sliding across a felt surface. When the card reaches the edge of the screen, the system **100** may generate a strong pop (e.g. a high magnitude, high frequency, short duration) effect to indicate the card has been discarded. The user may then drag another card to be discarded, or select the draw cards button **233** to receive a card to replace the discarded card **210***c*.

Shaking Virtual Dice

[0065] FIG. **8** shows a simulated screenshot of images associated with a casino gaming application executed by a system for casino gaming haptics according to one embodiment of the present invention. In the embodiment shown in FIG. **8**, a casino gaming system may be configured to allow the user to play a game that includes rolling one or more dice **810**. For example, a craps game may display a pair of dice **810** on a display. The user can select the dice **810** by touching the touch screen and holding his finger against the touchscreen over the dice. The user may then shake the dice **810** by moving the finger back and forth while maintaining contact with the touchscreen. A computer executing the gaming application receives an input signal from the touchscreen indicating that the user's contact with the screen is changing. The computer determines that the user is shaking the dice, and generates an actuator signal associated with the user's action.

[0066] In the embodiment of the present invention shown in FIG. **8**, a user rolls a pair of dice by touching an image of the dice **810** with a finger, dragging **820** across the screen, and lifting from the touch screen **800**. The system may output a steadily increasing low frequency vibration while the use drags the dice **810** across the touch screen **800**, and a pop when the system detects the force of contact with the touch screen **800** is below a threshold, which may indicate that the user is removing the finger from the touch screen **800**. In a further embodiment, the touch screen **800** may display the dice **810** on the screen within a box or other bounded region. The user may move the dice within the box to "shake" them, and drag them out of the box to roll them. The system may output a vibration while the user is shaking the dice **810**, and a different vibration when rolling the dice **810**.

[0067] In one embodiment of the present invention, a system for casino gaming haptics may generate haptic effects to be output during the shaking action. For example, a short duration high-magnitude haptic effect may be played each time there is a direction change of the finger. The sensation produced may be similar to the feel of real dice being shaken in a closed hand or in a cup. In addition, a continuous vibration may be played while the user is shaking the dice to simulate the dice rattling while being shaken. Further, the magnitude and/or the vibration may increase or decrease based at least in part on the speed at which the user shakes the dice. Such a sensation may provide a tactile indication that the user is interacting with the dice. When the user is ready to "throw" the dice, the user may release the dice by lifting his from the touch screen, or the user may move the dice out of a graphical region displayed on the screen. In another embodiment, the user may throw the dice by moving the dice out of a bounded area on the screen. The system may generate a different haptic effect for this throwing motion. For example, the system may generate a pop as the user throws the dice to provide a tactile response to the user. As the dice tumble to a stop, the system may output haptic effects to simulate the dice bouncing on a surface, such as a high magnitude, high frequency haptic effect for each bounce.

Virtual Roulette

[0068] FIG. **9** shows a simulated screenshot of images associated with a casino gaming application executed by a system for casino gaming haptics according to one embodiment of the present invention. In the embodiment shown in FIG. **9**, a casino gaming system may be configured to allow the user to play roulette. To play such a game, a user may spin the roulette wheel **930**, which may require the user to touch a finger on the touch screen **900** and drag **920** across the screen. The gaming system may provide a low-magnitude vibration when the user touches the screen, and increase the vibration as the roulette wheel **930** increases in speed. Finally, the user may perceive a pop or jolt, which may signify that the roulette ball has been released in to the wheel. Further, if the user maintains contact with the screen, the system may output additional pops each time the roulette ball bounces before settling on a number. Additional effects may be played as well.

[0069] For example, the user may allocate virtual casino chips **910** to the betting area for the roulette game. In such an embodiment, a user may make a betting selection by selecting a bet within the betting area **931**. The user may then be provided with a slider **911** to select the number of chips to bet. As the user slides a finger along the slider, the user may feel a low magnitude, low frequency pulse for every 10 chips to be bet, for example. Other haptic effects may be incorporated into such a game, such as pressing an on-screen rocker switch may start an increasing or decreasing vibration corresponding to speed, magnitude, or some other parameter of the roulette wheel. Throwing an onscreen switch to activate the roulette ball may supply a pop feeling.

Playing a Virtual Slot Machine

[0070] FIG. **10** shows a simulated screenshot of images associated with a casino gaming application executed by a system for casino gaming haptics according to one embodiment of the present invention. In the embodiment shown in

FIG. **10**, a casino gaming system is configured to allow the user to play a virtual slot machine. The user may be able to select a number of credits to wager, by pressing a button. The gaming system may provide haptic effects as the user presses the buttons. For example, the gaming system may generate a pop when the user presses a button to provide feedback that the button was pressed. The user may then be able to pull a virtual lever **1020** to begin the spinning of the virtual slot wheels **1030***a-e*. The gaming system may generate a low magnitude vibration when the lever **1020** has only been displaced a short distance, with the effect strengthening as the lever **1020** is displaced further. For example, in one embodiment of the present invention, the vibration may change frequency and/or vibration based on the displacement of the lever. When the user slides his finger off of the lever **1020** to activate the virtual slot wheels **1030***a-e,* a pop may be played to indicate the lever **1020** has been released. Additionally, a vibration may be output while the virtual slot wheels **1030***a-e* are spinning, with a high magnitude, high frequency effect being output when a virtual wheel **1030***a-e* comes to rest and an icon is displayed. A further haptic effect or haptic effects may be output when if the user wins credits based on the combination of icons presented by the virtual wheels **1030**.

Trivia and Brain-Teaser Games

[**0071**] FIG. **11** shows a game according to one embodiment of the present invention. In the embodiment shown in FIG. **11**, a user is presented with a trivia question and four potential answers to the trivia question. To play the game, a user may bet one or more chips prior to seeing a trivia question, and win chips by correctly answering the question. In such an embodiment, a user may receive haptic feedback in response to answering a question. For example, in one embodiment of the present invention, a system for casino gaming haptics may output a high-magnitude, low-magnitude effect to indicate a wrong answer. In one embodiment, a system for casino gaming haptics may output a high-magnitude, high frequency effect to indicate a correct answer.

[**0072**] FIG. **12** shows a game according to one embodiment of the present invention. In the embodiment shown in FIG. **12**, a user is presented with two nearly-identical images. In one embodiment of the present invention, the user attempts to locate the differences between the two images within a period of time. The user may bet chips according to the number of differences the user believes he can find between the two pictures, or the amount of time it will take to find the differences. The user may then touch a touch screen to indicate where a believed difference is located. In one embodiment of the present invention, a system for casino gaming haptics may output a pop effect to indicate that the user has correctly identified a difference between the two images. In one embodiment of the present invention, a system for casino gaming haptics may output two pops to indicate a wrong selection.

[**0073**] FIG. **13** shows a game according to one embodiment of the present invention. In the embodiment shown in FIG. **13**, a user is presented with a matrix of letters, and a list of words that can be found within the matrix. A user may drag a finger along a series of contiguous letters to identify words within the matrix. A system for casino gaming haptics according to one embodiment of the present invention may output haptic effects as the user identifies a word within the matrix. For example, in one embodiment of the present invention, a system may output a low magnitude pop for each letter the user drags a finger across. When the user has correctly identified a word, the system may output a different effect, such as a high-magnitude, low-frequency effect. If the user does not correctly identify a word, the system may output a different effect, such as a high-magnitude, high-frequency effect.

[**0074**] In one embodiment of the present invention, a game may require that a user find one or more invisible objects hidden on the screen. In such an embodiment, a user may contact a touch screen and drag a finger to locate the object. When the user has contacted the object, the system may output a haptic effect to indicate that the user has found the object. Further, the system may output different effects for different hidden objects. For example, a user may attempt to find a hidden star among several hidden objects. The system may output a different haptic effect when the user has contacted the star than for other hidden objects.

[**0075**] FIG. **14** shows a game according to one embodiment of the present invention. In the embodiment shown in FIG. **14**, a user is presented with a game card that includes a plurality of scratch-off areas displayed on a touch screen. A user may rub their finger on the touch screen on an area corresponding to a scratch-off area to expose an image. While a user is rubbing their finger to scratch off an area, the system may output a vibration to indicate that the user is scratching an area. The system may then output a pop to indicate that the are has been substantially completely uncovered.

General

[**0076**] Embodiments of the present invention may provide a more enjoyable casino gaming experience. Certain embodiments of the present invention may, for example, provide enhanced game-play enjoyment through tactile feedback. By providing haptic effects, it may be possible to provide an experience in which the user feels as though he is touching a gaming implement, such as a playing card, rather than an input device, such as a touch screen. Haptic effects may allow a user to move a finger across a touch screen and feel a playing card shown on the screen, or feel the rattle of dice being shaken. Such tactile sensations may provide a richer, more immersive experience for a player of an electronic casino game.

[**0077**] The foregoing description of the embodiments of the invention has been presented only for the purpose of illustration and description and is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Numerous modifications and adaptations thereof will be apparent to those skilled in the art without departing from the spirit and scope of the invention.

That which is claimed is:

1. A system, comprising:

a touch-sensitive input device configured to sense a contact from a user;

an actuator coupled to the touch-sensitive input device, the actuator configured to output a haptic effect to the touch-sensitive input device; and

a processor in communication with the touch-sensitive input device and the actuator, the processor configured to:

generate a display signal configured to cause an image associated with a casino game to be displayed;

receive an input signal from the touch-sensitive input device associated with the contact;

determine an interaction between the contact and the image; and

generate an actuator signal associated with the interaction, the actuator signal configured to cause the actuator to generate a haptic effect.

2. The system of claim 1, further comprising a display configured to receive the display signal and display the image associated with the casino game.

3. The system of claim 1, wherein the touch-sensitive input device comprises a touch screen.

4. The system of claim 1, wherein the casino game comprises one of blackjack, poker, solitaire, roulette, craps, checkers, picture match, trivia, or a slot machine.

5. The system of claim 1, wherein the haptic effect is associated with one of betting chips, winning chips, or losing chips.

6. The system of claim 1, wherein the processor is in communication with a remote device.

7. The system of claim 6, wherein the processor is further configured to receive the casino game from the remote device.

8. The system of claim 6, wherein the processor is further configured to transmit information to the remote device.

9. The system of claim 8, wherein the information comprises information associated with an action or a state of the casino game.

10. The system of claim 1, wherein the actuator is also in communication with a housing.

11. The system of claim 1, wherein the haptic effect is associated with one of shaking virtual dice, moving a virtual playing card, pulling a lever on a virtual slot machine, or spinning a virtual roulette wheel.

12. The system of claim 1, wherein the haptic effect is associated with one of correctly answering a trivia question, correctly identifying a difference between two similar images, or finding a word in a word search.

13. A method comprising:

displaying an image associated with a casino game;

sensing a contact with a touch-sensitive input device, the contact associated with the image;

receiving an input signal from the touch-sensitive input device, the input signal associated with the contact;

determining an interaction between the contact and the image, and

outputting a haptic effect to the touch-sensitive input device based at least in part on the interaction.

14. The method of claim 13, wherein the haptic effect is associated with changing a bet amount.

15. The method of claim 13, wherein the haptic effect is associated with winning a game.

16. The method of claim 13, wherein the haptic effect is associated with losing a game.

17. The method of claim 13, wherein the casino game comprises a card game.

18. The method of claim 17, wherein the haptic effect is associated with dragging a card.

19. The method of claim 17, wherein the haptic effect is associated with discarding a card.

20. The method of claim 13, wherein the casino game comprises craps.

21. The method of claim 20, wherein the haptic effect is associated with shaking dice.

22. The method of claim 20, wherein the haptic effect comprises a low frequency vibration and a high magnitude force.

23. The method of claim 22, wherein the high magnitude force indicates a change in direction of the dice.

24. The method of claim 22, wherein the low frequency vibration and the high magnitude force are output substantially at the same time.

25. The method of claim 13, wherein the haptic effect is associated with rolling dice.

26. The method of claim 25, wherein the haptic effect comprises a low frequency vibration and a pop.

27. The method of claim 26, wherein the pop is output as a user removes a finger from the touch-sensitive input device.

28. The method of claim 13, wherein the casino game comprises roulette.

29. The method of claim 28, wherein the haptic effect is associated with spinning a roulette wheel.

30. The method of claim 29, wherein the haptic effect comprises a vibration.

31. The method of claim 30, wherein the frequency of the vibration is associated with a speed of the roulette wheel.

32. The method of claim 30, wherein the magnitude of the vibration is associated with a speed of the roulette wheel.

33. The method of claim 28, wherein the haptic effect is associated with a roulette ball bouncing in a roulette wheel.

34. The method of claim 33, wherein the haptic effect comprises a pop.

35. The method of claim 13, wherein the casino game comprises a slot machine.

36. The method of claim 35, wherein the haptic effect is associated with pulling a lever.

37. The method of claim 36, wherein the haptic effect comprises a vibration.

38. The method of claim 37, wherein the frequency of the vibration is associated with a displacement of the lever.

39. The method of claim 37, wherein the magnitude of the vibration is associated with a displacement of the lever.

40. The method of claim 35, wherein the haptic effect is associated with a spinning slot wheel.

41. The method of claim 40, wherein the haptic effect comprises a vibration.

42. The method of claim 40, wherein the haptic effect comprises a high magnitude, high frequency effect.

43. The method of claim 13, wherein the casino game comprises a scratch-off game.

44. The method of claim 43, wherein the haptic effect comprises a vibration.

45. The method of claim 44, wherein the vibration is associated with a rubbing motion.

46. The method of claim 43, wherein the haptic effect comprises a pop.

47. The method of claim 46, wherein the pop is associated with a scratch-off area being substantially completely uncovered.

48. A computer-readable medium on which is encoded program code comprising:

program code for displaying an image associated with a casino game;

program code for sensing a contact with a touch-sensitive input device, the contact associated with the image;

program code for receiving an input signal from the touch-sensitive input device, the input signal associated with the contact;

program code for determining an interaction between the contact and the image, and

program code for outputting a haptic effect based at least in part on the interaction.

49. A device, comprising:

a housing;

a touch-sensitive input device;

an actuator configured to output a haptic effect to the touch-sensitive input device or the housing; and

a processor in communication with the touch-sensitive input device and the actuator, the processor configured to:

receive a casino game application,

generate a display signal configured to cause an image associated with the casino game application to be displayed,

receive an input signal from the touch-sensitive input device associated with a contact,

determine an interaction between the contact and the image,

generate an actuator signal associated with the interaction, the actuator signal configured to cause the actuator to generate a haptic effect, and

transmit the actuator signal to the actuator.

50. The device of claim 49, wherein the processor receives the casino game application over a network from a server.

51. The device of claim 49, wherein the touch-sensitive input device comprises a touch-screen.

52. A method, comprising:

requesting a casino game application from a server;

receiving the casino game application;

displaying an image associated with the casino game application;

sensing a contact with a touch-sensitive input device, the contact associated with the image;

receiving an input signal from the touch-sensitive input device, the input signal associated with the contact;

determining an interaction between the contact and the image, and

outputting a haptic effect based to the touch-sensitive input device at least in part on the interaction.

53. The method of claim 52, wherein receiving the casino game application further comprises receiving haptic information associated with the casino game application.

54. A computer-readable medium on which is encoded program code comprising:

program code for requesting a casino game application from a server;

program code for receiving the casino game application;

program code for displaying an image associated with the casino game application;

program code for sensing a contact with a touch-sensitive input device, the contact associated with the image;

program code for receiving an input signal from the touch-sensitive input device, the input signal associated with the contact;

program code for determining an interaction between the contact and the image, and

program code for outputting a haptic effect based to the touch-sensitive input device at least in part on the interaction.

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