

GAMING SYSTEM

FIELD OF THE INVENTION

[0001] The present application relates to a gaming system that is adapted to provide a simulated experience to a player, suitable, for example, for use in a land-based casino.

BACKGROUND OF THE INVENTION

[0002] One existing type of gaming system is the automated or semi-automated Electronic Table Game (ETG). ETGs present players with a digital incarnation of traditional games (such as roulette, blackjack and craps), which obviates the need for a live dealer or allows a live dealer to attend to a plurality of ETG player terminals. The ETG controls game speed and, in one existing ETG, hands are dealt successively with a 10–15 second interval between hands.

[0003] Another existing system is a virtual gaming system of the type employed by online casinos. One of the features of online casinos is that several hundreds or thousands of online players are enabled to wager on only a few virtual tables. This enables mass gaming at a pre-set pace controlled by the casino or game operator, which enhances profitability for the casino or game operator.

[0004] However, these features make such gaming systems unattractive to some 'premium' players, who typically prefer the traditional, casino gaming experience. Premium players are the high rollers or high end patrons of casinos, who typically play at the live tables of a casino where they can influence the pace of a game or frequent a preferred dealer. This is not possible with known virtual or online gaming systems. Furthermore, such systems make it difficult or impossible for the casino to verify the identity or other details of the player, whether for security or other reasons.

[0005] One existing, commercially available product is 'Ezugi360', a platform that enables a casino to engage a customer in live games away from the casino floor, such as on a customer's mobile device (e.g. smart phone or tablet

computer), tablets located at a bar, cabinets or terminals on the casino floor, special terminals located in and around a hotel, or a television in the customer's hotel room. Ezugi360 also uses camera streaming technology to monitor the dealer area, and presents a video feed of the dealer area to the customer.

[0006] US 2016/0012674A1 discloses a system comprising one or more player terminals and electronic gaming tables, and/or a remote server. The player is provided with a personalized player experience through variations in game rules, wager size and pay tables affecting payout amount and volatility that differ from that of a live table game.

[0007] It was also found that premium players typically desire to 'squeeze cards' as part of the game play. When squeezing a card, the player physically turn the card over in a manner and at a speed according to his or her preference. This is possible at live table games, but is not possible with ETGs as all cards are either dealt face up or are dealt face down and then revealed by the dealer immediately.

[0008] Online casinos have tried to recreate card squeezing by providing a customized printer to players (see, for example, KR 20140142757A). A player may, at his or her location, print the card that—online—has been dealt face down by the dealer. However the lag time involved in the printing of the card and the different physical or tactile quality of the printed card detracts from this ersatz card squeezing experience.

[0009] JP Patent No. 6496776B2 provides a simulated card squeeze system that simulates the player's squeeze with an electronic card displayed on a touch screen, initially portrayed as face-down.

[0010] Accordingly, it is an object of the present invention to provide a gaming system that is able to provide an improved or distinct player experience to a player, and/or a physical card squeezing feature for use with such a gaming system.

SUMMARY OF THE INVENTION

[0011] The following presents a simplified summary in order to provide a basic understanding of some aspects of the present invention. The summary is not an extensive overview of the present invention.

[0012] It is an object of the present invention application to address at least some of the challenges faced by known land-based casinos or online casinos.

[0013] According to a first aspect of the invention, there is provided a gaming system, comprising:

- at least one a player terminal, comprising a dealer viewing screen viewable by a player and a player input operable by the player;

- at least one dealer terminal operable by a dealer;

- a game controller configured to implement an at least partially electronic game;

- a controller in data communication with the player terminal, the dealer terminal and the game controller;

- wherein the controller is configured to:

- control display on the dealer viewing screen a video of the dealer (such as captured by a camera of the dealer terminal), a virtualized representation of the dealer (such as generated by processing the output of a camera of the dealer terminal), or a virtual dealer (such as generated by an artificial intelligence-based system);

- receive game play inputs from the player input; and

- control the game controller to implement the game according to at least the game play inputs.

[0014] It should be noted that the term 'dealer' is used on the broadest sense of 'conductor' or 'supervisor', such that the games are not limited to card games.

[0015] In an embodiment, the dealer terminal comprises a camera configured to capture images of the dealer at or operating the dealer terminal (such as still images or video, a 2D video camera and/or a 3D video camera).

[0016] In an example, the camera comprises a 2D-, 3D- or other video camera, and the controller receives a video feed from the camera and controls the dealer viewing screen to display the video feed.

[0017] In another embodiment, the gaming system further comprises a camera configured to capture images of the dealer at or operating the dealer terminal, and a motion capture system configured to capture motion of a dealer based on the images, wherein the controller comprises a virtualizer configured to generate a video of the dealer by processing the output of the motion capture system, and to generate virtualized images of the dealer using at least an output of the motion capture system suitable for display on the dealer viewing screen. Alternatively, the virtualizer may be configured to generate virtualized images of the dealer using the video of the dealer outputted by the camera.

[0018] In another embodiment, the gaming system further comprises a virtual dealer generator (such as implemented by the controller) configured to generate a virtual dealer suitable for display on the dealer viewing screen. The system may then display the virtual dealer to the player on the dealer viewing screen. The virtual dealer may be an AI driven dealer that mimics the motions of a real dealer. The virtual dealer may have one or more characteristics (e.g. language, sex or age) that are customizable, such as by the dealer, the player or based on player preferences.

[0019] In an embodiment, the dealer terminal comprises a green screen and the controller is configured to: key out green screen footage from a video feed received from the camera, stitch the video feed with a background, and output a stitched video feed to the dealer viewing screen.

[0020] In an example, the system is configured to display the dealer (whether actual dealer, virtualized dealer or virtual dealer) against a background on the dealer viewing screen, and the background is determined, generated, customizable or selected based on a received player input or player preferences.

[0021] In an embodiment, player input and/or the player terminal comprises any one or more of: a camera sensor, a touch sensor, a touch screen, a pressure sensor, a capacitive sensor, an inductive sensor, a light sensor, a temperature sensor, and a hand motion sensor. In the example of a pressure sensor, player input can be affected/qualified by how hard the player touches a touch screen; in the example of a capacitive sensor, the player would not have to touch the touch screen in order for the system to receive an input and determine therefrom the player input.

[0022] In an embodiment, the gaming system further comprises at least one piece of auxiliary game equipment, configured to mimic the appearance and/or feel of a corresponding piece of standard game equipment and comprising one or more electronic sensors, wherein the sensors respond to manipulation of the auxiliary game equipment by outputting signals to the controller and the controller is configured to form a characterization of the manipulation from the signals.

[0023] In an example, the piece of auxiliary game equipment comprises a playing card (such as that of the second aspect) that comprises one or more sensors. The sensors desirably include a flex sensor, an accelerometer, and/or an orientation sensor. The playing card may optionally comprise a display (such as an electronic paper display), with the controller configured to receive image data indicative of an image to be displayed on the display from the game controller and to control the display to display the image.

[0024] In an embodiment, the controller is configured to communicate with a message broker, wherein the message broker mediates data communication between the controller, the player terminal, the dealer terminal and the game controller. In an embodiment, the controller comprises an emotional state evaluator configured to determine an emotional state of a player of the game. The emotional state evaluator may be configured to output (e.g. display to the dealer) the determined emotional state, and/or the game controller may be configured to modify a game play of the game based on the determined emotional state of the player.

[0025] In an embodiment, the controller comprises a rolling commission

controller configured to implement a rolling commission programme.

[0026] According to a second aspect of the invention, there is provided an gaming method implemented in an electronic gaming system, the method comprising:

receiving game play inputs at a player terminal operated a player;

receiving game control inputs at a dealer terminal operated by a dealer;

implementing an electronic game at least partially with a game controller;

displaying on a dealer viewing screen a video of the dealer (such as captured by a camera of the dealer terminal), a virtualized representation of the dealer (such as generated by processing the output of a camera of the dealer terminal), or a virtual dealer (such as generated by an artificial intelligence-based system); and

controlling the game with a game controller according to at least the game play and game control inputs.

[0027] According to a third aspect of the invention, there is provided an electronic playing card for use with an electronic gaming system, the electronic playing card comprising:

one or more flex sensors; and

a controller;

wherein the electronic playing card is flexible;

the flex sensors are located to detect flexing of the electronic playing card and to output signals indicative of the flexing in response thereto; and

the controller is configured to receive the signals from the flex sensors and output the signals to the electronic gaming system, the signals being configured or suitable to allow the electronic gaming system to determine how the electronic playing card has been manipulated.

[0028] In an embodiment, the electronic playing card further comprises a display, wherein the controller is configured to receive image data indicative of an image to be displayed on the display from the electronic gaming system and to control the display to display the image.

[0029] In an embodiment, the electronic playing card further comprises one or more accelerometers configured to output accelerometer signals indicative of an acceleration of the electronic playing card to the controller, wherein the controller is configured to output the accelerometer signals to the electronic gaming system.

[0030] In an embodiment, the electronic playing card further comprises at least one gyroscope or other orientation sensor configured to output orientation signals indicative of an orientation of the electronic playing card to the controller, wherein the controller is configured to output the orientation signals to the electronic gaming system.

[0031] In an embodiment, the electronic playing card is configured to support wireless communication between the controller and the electronic gaming system (such as by including a suitably configured wireless communication bus).

[0032] In an embodiment, the controller is configured to communicate with a game controller of the electronic gaming system

[0033] In an embodiment, the display constitutes a face of the electronic playing card.

[0034] In an embodiment, the electronic playing card further comprises a compass sensor configured to output compass signals indicative of an orientation of the electronic playing card to the controller, wherein the controller is configured to output the compass signals to the electronic gaming system.

[0035] In an embodiment, the electronic playing card further comprises a wireless charging mechanism.

[0036] In an embodiment, the signals output by the controller to the electronic gaming system are configured or suitable to allow the electronic gaming system

to animate a simulation of the electronic playing card.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] For a more complete understanding of the present invention, embodiments thereof are now described, by way of example, by reference to the accompanying drawings, in which:

[0038] FIG. 1 is a schematic view of a gaming system according to an embodiment of the present invention;

[0039] FIG. 2A is a schematic view of a gaming system according to a variation of the embodiment of figure 1;

[0040] FIG. 2B is a schematic view of a gaming system according to another variation of the embodiment of figure 1;

[0041] FIG. 3 is a schematic view of the player terminal of the gaming system of figure 1;

[0042] FIG. 4 is a schematic view of a piece of auxiliary game equipment of the gaming system of figure 1;

[0043] FIG. 5 is a schematic view of the player display of the player terminal of FIG. 3;

[0044] FIG. 6 is a schematic view of the dealer terminal of the gaming system of FIG. 1;

[0045] FIG. 7 is a schematic view of the controller of the gaming system of FIG. 1;

[0046] FIG. 8 is a schematic view of a smart playing card according to an embodiment of the present invention;

[0047] FIG. 9 is an exploded schematic view of the smart playing card of figure 8; and

[0048] FIG. 10 is a photograph of a partial prototype the smart playing card of figure 9; and

[0049] Figure 11 is a flow diagram overview of a method according an embodiment of the present invention of using a gaming system that includes a player terminal, a dealer terminal and a controller, such as the gaming system of FIG. 1.

DETAILED DESCRIPTION OF EMBODIMENTS

[0050] Embodiments of the present invention will be further described hereinafter with reference to the accompanying drawings. It is to be understood that specific embodiments described herein are only intended to explain the present application, and are not taken to limit the present application. Further, it will be appreciated that the examples provided represent only one of many possible implementations of the present application. Modifications and variations are possible in light of the above teachings or may be acquired from practicing of the present application, without departing from the breadth or scope.

[0051] It is also to be understood that the following claims are intended to cover all of the generic and specific features of the present application herein described and all statements of the scope of the present application which, as a matter of language, might be said to fall therebetween.

[0052] As used herein, singular forms, such as "a" and "an," are intended to include the plural forms as well, unless the context indicates otherwise. Additionally, the terms, "includes," "including," "comprises" and "comprising," specify the presence of the stated elements or steps but do not preclude the presence or addition of one or more other elements or steps.

[0053] A gaming system 100 according to a first embodiment of the present invention is depicted schematically in figure 1. Gaming system 100 includes a player terminal 102, a dealer terminal 103 and a controller 104, with player terminal 102 and dealer terminal 103 in electronic communication with controller 104. The player terminal 102, the dealer terminal 103 and the controller 104 may be located remotely from one another. The controller 104 may also be

integrated with either one or both of the player terminal 102 and the dealer terminal 103.

[0054] Gaming system 100 may optionally include a betting station 1002 in which the player terminal 102 would be located. Likewise, gaming system 100 may optionally include a dealer studio 1003, within which dealer terminal 103 would be located; to improve the overall immersiveness of the gaming experience, the dealer studio 1003 may optimally include design aesthetics, such that the look and feel of the dealer studio 1003 mimics that of a conventional live table game.

[0055] The player terminal 102 is configured to be used by a player, or by a group of players such that the player terminal 102 would constitute a communal terminal with multiple sets of input and output devices and thereby mimicking a private salon table with multiple betting positions. The player(s) may play a game or games using player terminal 102, whether player terminal 102 is provided within a betting station 1002 or not. Although player terminal 102 may be provided as a communal terminal, it is preferable for each individual player to be assigned an individual player terminal 102. Consequently, while gaming system 100 is depicted with one player terminal 102, in practice it may include a plurality of like player terminals 102.

[0056] Typically, gaming system 100 includes one dealer terminal 103, configured to be operated by a dealer (such as situated within a dealer studio 1003) to discharge the duties of a dealer. This, however, does not preclude gaming system 100 having more than one dealer terminal 103.

[0057] Figures 2A and 2B are schematic views respectively of gaming system 100' and gaming system 100'' according to alternative embodiments. Gaming systems 100', 100'' are comparable in many ways to gaming system 100 of figure 1, but illustrate that gaming systems according to the present invention may have a variety of architectures. Thus, gaming system 100' of figure 2A and gaming system 100'' of figure 2B both include a game controller 105 and a database 106 (for storing information, such as data related to registered players). However, in gaming system 100' of figure 2A, game controller 105 and database 106 are arranged separately from controller 104 (and may be remote

therefrom), while in gaming system 100" of figure 2B, game controller 105 and database 106 are integrated into controller 104.

[0058] In broad terms and as is described in further detail below, the dealer terminal 103 includes one or more cameras and microphones and the player terminal or terminals 102 include one or more displays and loudspeakers, so that the player(s) at the player terminal(s) 102 can view and hear the dealer as though located with the dealer in a traditional setting, even if in fact located remotely from the dealer. The actions (including utterances) of the dealer can be streamed to the player(s) (and optionally recorded for security, auditing or other purposes) using the player terminal(s) 102. Player terminal 102 may optionally include one or more cameras and microphones that capture the actions (including utterances) of the player(s) for streaming to the dealer at dealer terminal 103, though in some embodiments the player(s) can communicate with the dealer using one or more input devices (e.g. a touch screen or a keypad).

[0059] Through the use of the capabilities of the player terminal 102 and the dealer terminal 103, information feedback loops are provided between dealers and players. This mimics the information feedback that would typically be available in a casino between dealer and player(s) in the course of a conventional live table game. This permits the casino and dealer to provide to a player or players located remotely from the dealer, a personalised and immersive experience, mimicking and enhancing the experience a player would have had, had the player been in the physical presence of the dealer, such as at a conventional live table game.

[0060] Figure 3 is a schematic view of player terminal 102. Player terminal 102 includes a player terminal input 201 and a player terminal output 202. Player terminal input 201 includes one or more player cameras 211, a player input 212, a heart rate sensor 213, and a card reader 214 (and optionally auxiliary game equipment 215).

[0061] Player camera 211 is arranged to capture those elements of the actions of the player(s) regarded as relevant to the game play or otherwise desirable, and to stream its output to the dealer terminal 103. Player camera 211 may also be provided with or use with facial recognition systems. Such facial recognition

systems may recognise and register a player, causing personal information of the player to be retrieved (such as from a database 106) and provided to casino management and/or the dealer. Player camera 211 may also be provided with or employ with an eye or retinal tracking systems. Such eye or retina tracking systems may then be used to determine a player's direction and angle of visual gaze, and this information may be communicated to dealer terminal 103, either in raw or processed form; it may then be displayed to the dealer on a display of dealer terminal 103, such as in the form of an indicium either on a reproduction of what is displayed to the player or a view of the player's environment as captured by player camera 211. The dealer may use the communicated information to determine the gaming behavior of the player and thereby be better equipped to provide the player with a personalised experience.

[0062] Player Input 212 includes one or more touch panels, buttons, motion sensors, microphones and/or other sensors suitable for accepting player inputs for controlling play or for communicating with the dealer. Player input 212 is thus controllable to play a game, such as to place a wager, to input game preferences, or to input preferences for player terminal 102—such as a preferred background display for player display 221 or a preferred avatar—or to otherwise control player terminal 102 and player display 221. Motion sensors may be configured to detect a player's hand gestures when made in the general area around him or her while using player terminal Input 201, or when made within an area proximate to player display 221. Microphones may be configured with voice recognition capabilities, so that they can accept voice commands from a player. Microphones may also be configured to allow a player to directly speak to a staff member, such as the dealer.

[0063] Heart rate sensor 213 is used to detect and obtain the heart rate of a player, and to communicate that information to dealer terminal 103, either in a raw form or a processed form (processed by an emotional state evaluator, described below). In a processed form, the information may be used to indicate an emotional state of the player. In some embodiments, the heart rate of the player may be obtained using a dedicated sensor. In other embodiments, the heart rate of the player may be obtained from a provided video feed. In some embodiments, machine learning algorithms may be implemented to process the

heart rate information, along with other inputs such as visual data from player camera 211 (including standard visual information, facial recognition, and/or eye/retinal tracking) and audio data from microphones of player input 212 (including standard audio information, recognised spoken words, and/or recognised voice patterns). Other forms of input may also be used to determine the emotional state of the player. The determined emotional state of the player may then be presented to the dealer, as described further below. Card reader 214 is configured to read a player's unique identifier, and register a player, thereby allowing personalised information to be retrieved from, for example, a database 106.

[0064] Auxiliary game equipment 215 includes one or more pieces or equipment configured to mimic the appearance and/or feel of a corresponding real piece of game equipment, such as a playing card, a dice shaker, a domino, etc., but provided with one or more electronic sensors (e.g. flex sensors, accelerometers) for allowing the manipulation of the auxiliary game equipment 215 to generate outputs that are received by controller 104; based on the outputs, controller 104 forms a characterization of that manipulation. The specific choice of real game equipment will be largely dependent on the game(s) provided by gaming system 100. A player is thus able to use the auxiliary game equipment 215 in place of the real game equipment, so as to mimic the experience of playing a conventional live table game. Auxiliary game equipment 215 may be made from plastic or other material.

[0065] In a particular embodiment (depicted schematically in figure 4), the auxiliary game equipment 215 mimics a playing card, and includes a communications module 2152. Communications module 2152 may be a microprocessor, or a system on a chip. Communications module 2152 facilitates electronic communication between auxiliary game equipment 215 and the main portion of player terminal 102. Auxiliary game equipment 215 optionally includes a sensor 2151 configured to detect a physical change in the auxiliary game equipment 215, such as a change in position or orientation, or any deformation thereof such as bending or compression or breakage. In embodiments that include sensor 2151, communications module 2152 is in electronic communication with sensor 2151, and is configured to transmit information

detected by sensor 2151 to player terminal 102.

[0066] In this particular embodiment, for example, when wagering on a card based game, a card may be dealt face down by a dealer at the dealer terminal 103. The player is able to use the auxiliary game equipment 215 to perform a card squeezing action on the auxiliary game equipment 215 (mimicking a card) so as to physically turn the card over in the manner and at a speed according to personal preference. The player is thereby able to control the animation, on a virtual card presented to him on player display 221 of player terminal 102, the card squeezing action employed when playing a conventional live table game. The virtual card may be presented to the player on player display 221 or on the auxiliary game equipment 215 itself (as discussed further below).

[0067] The auxiliary game equipment 215 of this particular embodiment or others can be connected directly to the player terminal 102, or may be connected via wired or wireless means, such as via electronic cables interfaces such as USB, or radio interfaces such as Bluetooth or Wi-Fi, or any other means that will be apparent to the skilled person.

[0068] Sensor 2151 may include or comprise a flex sensor that is able to detect and output a bend value. The flex sensor may include electronic components that change in resistance when they are bent, such change in resistance preferably predicable in accordance to a degree of bending. Electronic components may then detect a change in measured resistance value, and translate the measured resistance value into a bend value. In some arrangements, a raw resistance value may be output, and further processing may be done to obtain a true bend value. Sensor 2151 may include a direction sensor, such as a compass or a gyroscope, and sensor 2151 may include an accelerometer. The compass, gyroscope, and accelerometer may be MEMS based. In some embodiments, sensor 2151 may include a heart rate sensor 213.

[0069] The Auxiliary Game Equipment 215 of this particular embodiment and of other embodiments may further comprise a display 2153. Display 2153 may be a rigid or flexible display, and may be a LED, an LCD, an electronic paper display, or any other suitable display means that will be apparent to the skilled user. Display 2153 may be configured to display an image corresponding to a

game result (for example, a dealt playing card), or any other information such a message or a clue. In some embodiments, display 2153 may be an electronic paper display, advantageously allowing for power efficiency as a displayed image may be retained on the Display 2153 in the absence of electrical power. Display 2153 is in electronic communication with the communications module 2152, either wired or wirelessly, such as via electronic cables interfaces, radio interfaces, or any other means that will be apparent to the skilled person. The auxiliary game equipment 215 may be powered by power source 2154 that is either internal (such as a battery), or external (such as a power cable or a wireless inductive charging interface).

[0070] The auxiliary game equipment 215 is advantageously designed to be easily dismantled for maintenance. This may be achieved magnetically by using a magnet 2155, which may comprise a permanent magnet, an electromagnet, or any other magnetic means that will be apparent to the skilled person, located to hold together some or all of the components of the auxiliary game equipment 215.

[0071] Returning to figure 3, player terminal output 202 comprises at least a player display 221 and/or a player haptics device 222. Referring to figure 5, the player display 221 includes at least one screen display 2211, which may include a LED or LCD screen, or any other similar screen display technology that will be apparent to the skilled person. Player display 221 is located conveniently viewable by a player when using player terminal 102. In a solo configuration (with one player using the player terminal 102), the viewing angle of the screen display 2211 is configured for use by a single player.

[0072] In another embodiment, screen display 2211 is provided as an external screen display, such as where it is desired that a plurality of players participate at a plurality of player terminals 102 sharing one or more common screen displays 2211. In such a configuration, the external screen display 2211 is configured to facilitate the sharing of the screen display(s) 2211 by the two or more player terminals 102. In this configuration, the viewing angle of the screen display 2211 is configured for the concurrent use of two or more players.

[0073] Screen display 2211 itself includes a Three-Dimensional ("3D") Display

Screen, preferably an Autostereoscopic 3D Display Screen. Screen display 2211 may optionally be configured to display a variety of information, provided using a single or multiple screen displays, such as a dealer viewing display 2251, a wager display 2252, a game results display 2253 and a peripheral screen display 2254. Dealer viewing display 2251 provides a live 2D or 3D recorded video data stream of the dealer.

[0074] Dealer viewing display 2251 may also provide a live virtualised video data stream of the dealer. Wager display 2252 provides visual information regarding the current game or wager. Wager display 2252 may also provide information such as game rules, or various administrative settings that a player may use to personalise his gaming experience. Wager display 2252 may also be configured to display information regarding a plurality of games, either concurrently or otherwise. Game results display 2253 provides visual information regarding the current game result, and may also provide historical game results information. Peripheral screen display 2254 provides information regarding a player's virtual lucky charm. It will be apparent to the skilled person that any practical number of screen displays 2221 may be configured within player display 221.

[0075] Referring to figure 3, the player haptics device 222 includes a contact based haptic system. Player haptics device 222 may also include a mid-air based haptic system. Player haptics device 222 may be configured to be used with auxiliary game equipment 215. Player haptics device 222 is adapted to be installed and used proximate to the player when using or near player terminal 102, such as in near player input 212, or where the player may have physical contact with the equipment or furniture at or near player terminal 102 (such as a chair, an armrest, a leg rest, etc.). Player haptics device 222 provides the player with haptic interaction.

[0076] Figure 6 is a schematic view of dealer terminal 103, which includes a dealer terminal input 301 and a dealer terminal output 302. Dealer terminal input 301 comprises at least one dealer camera 311, a green screen 312, a motion capture system 313, and a game results generator 314. Dealer camera 311 is configured to capture actions of the dealer, such as those regarded as

relevant to game play or player satisfaction. The capture video data is streamed to player terminal(s) 102, either in raw or processed form. Dealer camera 311 may comprise a 2D camera and/or a 3D camera (such as a light field camera or a camera configured with a sensor arrangement such that it is able to perceive and record depth data). Dealer camera 311 may comprise a plurality of cameras working in conjunction to provide a 3D image, such as a stereoscopic pair of 2D cameras, or a 2D camera coupled with a time-of-flight camera.

[0077] Dealer camera 311 may also comprise a 2D camera working in tandem with a projector, the 2D camera and the projector forming a stereoscopic pair. The projector in such cases is configured to project an optimally regular pattern, such as a dot matrix, or a grid. Dealer camera 311 may then be configured to perceive and record depth data based on the distortions of the pattern projected onto the dealer.

[0078] Dealer camera 311 may comprise other image capture technologies, 3D or otherwise, that will be apparent to the skilled person.

[0079] Green screen 312 includes a chroma-keyable background, and may comprise a solid coloured background of, for example, blue or green in colour. Other backgrounds that may be suitable for use as the green screen 312 will be apparent to the skilled person. Green screen 312 is preferably positioned behind the dealer, such that the dealer is situated between dealer camera 311 and green screen 312. In such a configuration, dealer camera 311 perceives and records both the dealer and green screen 312. Dealer camera 311 can thereby record the actions of the dealer with a chroma-keyable background.

[0080] In some embodiments, dealer camera 311 is configured to perform a background removal by any suitable technique. In one example, this is achieved by chroma-keying green screen 312 out of the recorded image, such that the recorded image is that of the dealer with an alpha layer, which is then output by dealer camera 311. In another example, system 100 implements (such as in dealer terminal 103) an edge detector 315 and a face detector 316, which together remove the background from the dealer video feed, hence without requiring a green screen. In certain embodiments, dealer camera 311 is configured to output the recorded image in its raw form, such that the chroma-

key may be applied as a form of post processing. In some embodiments, the chroma-key process may be assisted by edge detector 315 and face detector 316. Other suitable background removal processes, including other processes that do not require the use of green screen 312, as will be apparent to the skilled person, may alternatively be employed.

[0081] Green screen 312 may be further provided with a lighting mechanism configured to illuminate both the dealer and green screen 312, in such a manner that there is adequate visual separation between the dealer and the Green Screen 312.

[0082] Motion capture system 313 is configured to detect and record the motions of a dealer, so—for that purpose—includes motion capture mechanisms such as a motion capture suit and/or a motion capture glove. Motion capture system 313 may include optical or non-optical motion capture systems. Optical motion capture systems may include passive marker, active marker, or markerless systems. In one example of a markerless system, system 100 implements (such as in motion capture system 313) a motion capture processor 318, configured to receive the video feed and to detect and capture the motions of the dealer; in this example, the motion capture system does not require a motion capture suit or motion capture glove, and instead simply relies on the software implemented motion capture processor 318 to process the video feed. Non-optical motion capture systems may include inertial, mechanical, or magnetic systems.

[0083] Games results generator 314 is configured to determine a game result, and is typically in the form of a random or pseudo-random number generator. Alternatively, games results generator 314 may be integrated with real game equipment. Games results generator 314 is configured to provide an output of the game, such that the success (or failure) of a wager may be determined. In some embodiments, games results generator 314 is configured to process two or more games (including two or more game types) simultaneously. In some embodiments, games results generator 314 is configured to process a single game.

[0084] In an embodiment, wherein the game is a playing card game, games

results generator 314 may be integrated with real game equipment in the form of an electronic playing table configured to perceive and record the value of a playing card that is placed face down on the electronic playing table. For example, games results generator 314 include or be interfaced with an electronic card shoe that is able to perceive and record the value of a card as it is drawn from the electronic card shoe may be provided. In this configuration, the playing cards used may be a standard playing cards, or a special set of playing cards marked by visual markings (such as a patterned code) or by digital markings (such as an RFID tag). In some embodiments, when the game is a playing card game, games results generator 314 includes a robotic dealer, such as a humanoid robotic dealer. The robotic dealer may take the place of a human dealer, and perform the usual dealer functions such as controlling the pace of a game (including gesturing for wagers to be placed and for confirming wagers before the start of a round, among others), and dealing cards (for example, from an electronic card shoe). To assist the robotic dealer in clearing the dealt cards, a conveyer belt may optionally be provided on or in the electronic playing table. In an embodiment, when the game is a roulette game, games results generator 314 may be integrated with real game equipment in the form of an automated roulette wheel. In an embodiment, the game is a dice game and games results generator 314 is integrated with real game equipment in the form of an automated dice shaker.

[0085] In some embodiments, a fully automated game equipment, such as a fully automated roulette wheel or a fully automated dice shaker may be used. In these embodiments, the fully automated game equipment may be configured in either of two modes: a continuous mode or a dedicated mode. In some embodiments, the fully automated game equipment may be configured to be switchable between the continuous mode and the dedicated mode. In the continuous mode, the fully automated game equipment periodically (without relying on input from a player or dealer) generates a game result, providing for wagers to take place in the interim time. In the dedicated mode, the fully automated game equipment is configured to generate a game result based only on input from a player terminal 102. Thus, in the dedicated mode, the fully automated game equipment is reserved for use by a specific player.

[0086] Dealer terminal output 302 includes at least one dealer display 321, configured to provide, to the dealer, information that is helpful for the dealer in discharging his or her duties, such as the instructions for the current game, or information to assist the dealer in providing a personalised experience for the player (this may include cues relating to the preferences of a player, visual data relating to a player's visual gaze, or a player's emotional state). Optionally, dealer display 321 may be configured to provide a video stream of the player(s)—although this may not be desired in some implementations, whether for player privacy reasons or otherwise.

[0087] Figure 7 is a schematic view of the controller 104 of gaming system 100. As mentioned above, controller 104 may optionally be integrated into player terminal 102 and/or dealer terminal 103.

[0088] Controller 104 is in electronic communication with player terminal(s) 102 and dealer terminal 103 and is configured to execute programmable logic that seeks to establish and maintain information feedback loops between player terminal 102 and dealer terminal 103. In this embodiment, controller 104 comprises a game controller 105 configured to control various functions of a game engine, such as processing game results, processing wager inputs, matching game results to wagers, and payment. In another embodiment, controller 104 is adapted to be compatible for use with a plurality of different types of game controllers. In this embodiment, controller 104 is a game controller-agnostic device, which improves the adaptability of gaming system 100, for use in relation to a variety of games.

[0089] Controller 104 may optionally include one or more databases 106 (which may be local or remote) for storing information, such as data related to registered players, or be configured to access such a database. Database 106 may include, for example, a CRM system 416 and a CMS 417. CRM system 416 stores and manages data related to a player's preferences in relation to playing the game and/or settings preferences for player terminal 102 such as a preferred background display for player display 221, a preferred avatar, language preferences of the player, or specific play preferences such as the speed of play. The CRM system 416 may also store other data such as the

player's records of wins or losses. The player can input and/or adjust any of his or her preferences via player input 212. CRM system 416 may continually update a player's preferences. CMS 417 stores and manages all details of the players, such as the player's unique identifier and the player's account details.

[0090] Controller 104 includes a green screen module 401, a virtualizer 402, a teleprompter controller 403, a dealer view module 404, a service request module 405, a lucky charm module 406, a data analytics engine 408, a commissions module 407, a face recognizer 410, a virtual game equipment controller 411, a scoreboard module 412, a haptics module 413, a game module 414 (which may be in the form of a Unity (trade mark) game module), and an emotional state evaluator 415. These various components may be in communication with each other via any suitable mechanism. In one example, however, system 100 includes a message broker for configured to mediate this communication, which is advantageous in improving the serviceability and fault tolerance of the system by reducing complexity and variation in the communication layer. Further, the message broker also allows for the implementation of a universal encryption service, improving security management.

[0091] Green screen module 401 accepts, as input, the data output from the dealer camera 311. It is preferred that the green screen module 401 be used in conjunction with the green screen 321. In the embodiments in which dealer camera 311 is configured to chroma-key green screen 312 out of the recorded image, green screen module 401 receives, as input, the recorded image of the dealer with an alpha layer. In the embodiments in which dealer camera 311 is configured to output the recorded image in its raw form, green screen module 401 receives as input the raw recorded image. In such embodiments, green screen module 401 may apply the chroma-key onto the raw recorded image. Green screen module 401 allows the stitching of the live video data feed from dealer camera 311 with the preferred background that may be selected by the player through player input 212 or retrieved from CRM system 416. This stitched together live video data feed may then be sent to player display 221, optimally to dealer viewing display 2251. The transmission to player display 221 may optimally be made by dealer view module 404.

[0092] Virtualizer 402 renders an image or video feed of a virtualized dealer based on a preferred avatar that may be selected by the player through player input 212 or retrieved from CRM system 416. The video data feed of a virtualized dealer is then sent to player display 221, optimally to dealer viewing display 2251. The transmission to player display 221 may optimally be made by way of dealer view module 404.

[0093] Teleprompter controller 403 relays video feedback obtained from player camera 211 or retrieved preferences of the player in relation to playing the game from CRM system 416, to dealer display 321. Teleprompter controller 403 desirably controls the display of cues or prompts to the dealer, to assist the dealer in determining how to proceed with the game, such as by personalizing the game in accordance with player preferences of one or more of the players (such as of the first player to join the table). For example, the teleprompter controller 403 will be able to display timers to pace the dealer's dealing, card reveal, and other game sequence activities, personalised in accordance with the player preferences of one or more of the players.

[0094] Dealer view module 404 receives the inputs from green screen module 401 and virtualizer 402, and streams the final dealer video data feed to player display 221.

[0095] Service request module 405 receives and controls responses to service request(s) from the player; it contains various contact details so can redirect requests as appropriate or control the retrieval and display of information requested by the player. Player input 212 includes service request icons, such as of the player's favourite restaurant or food outlet retrieved from the CRM system 416. Service request module 405 is activated when the player selects any of the service request icons. The player may request that service staff to attend the player. After receiving the service request from the player, service request module 405 directs the service request to the responsible staff member via SMS alerts or other messaging service, or to a general service center for processing.

[0096] Lucky charm module 406 permits the player to select his preferred 3D lucky charms from his personal library of lucky charms, displayed on the peripheral screen display 2254. The preferred 3D lucky charms are created in

advance and loaded into the private library associated with the player based on his or her unique identifier. The 3D lucky charms may be personalised by the player using player input 212.

[0097] Data analytics engine 408 receives the confirmed wager and the game results from game controller 105 in the real-time environment, and computes the relevant metrics in real-time and stores the data to a centralized repository. This central repository indexes all data received from data analytics engine 408 in accordance with the player.

[0098] Upon an identification of a player, commissions module 407 receives from the CMS 417 details of the player's commission programme (which may be a rolling commission programme, as described below), if any. These details include, for example, the commission rates allocated to the player, the type of programme (e.g. cash deposit or credit), a rolling volume (in the case of a rolling commission programme) and a total commission earned by the player since joining the programme. CMS 417, employing for example a CMS "Power Bank" feature, stores and retrieves the player's available credit, such credit received either as a front money deposit by the player or through a credit team after the player's credit facility has been approved. CMS 417 also sends the retrieved available credit information to commissions module 407. As the player participates in games, commissions module 407 determines the commission earned by the player and updates the player's 'available credit' record. The earned commission and total credit available are sent to player display 221, optimally to wager display 2252. Commissions module 407, operating in collaboration with data analytics engine 408, may also generate notifications regarding information on the next commission tier, and these notifications may be sent to player display 221, optimally to game results display 2253. Commissions module 407, in collaboration with data analytics engine 408, may also evaluate a weighted house edge based on a wagering pattern of the player and generate dynamic commissions for the player based on configurable set of guidelines. This may be performed, for example, with the aid of a machine learning algorithm that processes player wager and commission information and builds a model of a player's playstyle, such as to determine when a player's playstyle qualifies, or becomes suitable, for a higher commission rate. In an

example, after every wager has been input by a player, the machine learning algorithm determines and associates a percentage confidence with how well the player fits a predetermined commission tier, and adjusts the player's commissions if change is determined to be necessary or desirable. Optionally, the machine learning algorithm also generates and sends notifications to a staff member, the notifications including recommendations to offer a higher or lower commission tier to a player during the player's current commission programme or for any subsequent programme that the player signs up for. At the end of every gaming session, or at multiple preconfigured times during a player's gaming session, commissions module 407 sends information back to CMS 417 to update the details of the player's programme, and any other relevant player account information. This information, once updated and stored in CMS 417, may be made available to the player via any player terminal at which that player has authenticated him- or herself.

[0099] In the first step, face recognizer 410 receives a player's still image from player camera 211. In the second step, the player inserts the player's unique identifier into card reader 214, and face recognizer 410 retrieves the existing player's profile image from CRM system 416. Face recognizer 410 compares the two images to check the player's identity, and sends the results of that check to game module 414. Once the confirmation of identity is made, a personalized 'Welcome Message' is displayed on player terminal 102 together with other relevant information as may be prescribed.

[0100] It is preferred that virtual game equipment controller 411 be used in conjunction with an auxiliary game equipment 215. Virtual game equipment controller 411 receives a game result from game results generator 314, then informs a player, via player terminal output 202, of the choice to use the auxiliary game equipment 215. Virtual game equipment controller 411 then receives—from player input 212—the player's determined choice. Virtual game equipment controller 411 accepts input from the auxiliary game equipment 215, such as information detected by sensor 2151 regarding a physical change in auxiliary game equipment 215. Based on the received input, virtual game equipment controller 411 determines a change in a piece of virtual game equipment, and responds by transmitting data indicative of that change (or of

the changed state) to player display 221, optimally to game results display 2253. The transmission to player display 221 may optimally be made by way of game module 414.

[0101] Virtual game equipment controller 411 may also communicate to the dealer via dealer display 321, such as to communicate information regarding the player's choice to use the auxiliary game equipment 215 and/or an acknowledgment from the player of the completion his or her action(s) on the auxiliary game equipment 215. The communication to dealer display 321 may optimally be made by way of teleprompter controller 403.

[0102] Scoreboard module 412 receives game results from game controller 105 and/or cues from the dealer on game completion, which it transmits to player display 221. Scoreboard module 412 may optionally also retain the game results in memory. Scoreboard module 412 may also be configured to control the display of game or player trends (as determined, for example, by data analytics engine 408); multiple trends may be displayed simultaneously or sequentially. Scoreboard module 412 may be configured based on the player's preferred scoreboard settings (including which of the multiple trends the player would like to be presented with, among other preferences), retrieved from CRM system 416.

[0103] Optionally, scoreboard module 412 may be configured to also transmit scoreboard data to peripheral screen display 2254 through game module 414. Scoreboard module 412 may also be configured to receive and transmit game results from multiple games (including from multiple game types), simultaneously or sequentially, thereby streamlining the experience for a player, which also improves the serviceability of the system, as multiple scoreboard modules are therefore not required for multiple games.

[0104] Haptic module 413 receives outputs from game module 414 to trigger the activation of player haptics device 222.

[0105] Game module 414 is a user interface layer to render, for example, lucky charms and 3D animations to game results display 2253. Game module 414 receives inputs from (i) game controller 105, (ii) player terminal 102, (iii) virtual

game equipment controller 411, (iv) facial recognizer 410, (v) scoreboard module 412, (vi) lucky charm module 406, and/or (vii) CRM systems 416. Game module 414 outputs to (i) player display 221 and/or (ii) haptics module 413.

[0106] Emotional state evaluator 415 is configured to processes various inputs concerning a player, and to output on that basis a measure of the emotional state of the player. In this example, emotional state evaluator 415 receives physiological inputs from any one or more of face recognizer 410, haptics module 413, and heart rate sensor 213, as well as game results from game results generator 314. Emotional state evaluator 415 may optionally also receive and employ the historic and recent wagering behavior of the player, the player's game outcomes (e.g. size of wins and/or losses), and the player's game play speed.

[0107] Emotional state evaluator 415 determines, from one or more of these inputs, a measure of the emotional state of the player. For example, increased heart rate (as determined from an input received from heart rate sensor 213) and/or a rapidly fluctuating haptics feedback signal (from haptics module 413) may indicate player stress or nervousness. An increased uncertainty in a player facial recognition determination (from face recognizer 410) may suggest a heightened emotion (reflected in an other than passive facial expression), whether positive or negative. Emotional state evaluator 415 is configured to be heuristic, so correlates game results (from game results generator 314) with physiological inputs, where game result can be treated—for example—as another indicator of emotional state (as a good game result will generally be associated with a positive emotional state, and a poor game result with a negative emotional state). On this basis, emotional state evaluator 415 builds a library for each player correlating likely emotional state with inputs from face recognizer 410, haptics module 413 and heart rate sensor 213 (such as combined in a linear or other combination, with coefficients progressively determined and refined heuristically over repeated player/system interaction).

[0108] The determined emotional state of the player may be displayed to the dealer, such as on dealer display 321. The determined emotional state of the player may be used by casino management to tailor subsequent communications

with the player. For example, the determined emotional state of the player can be used to generate recommendations in the form of suggested marketing communication, offers, gifts and other forms of interventions to provide a better gaming experience and also, if appropriate, to address problem gaming behavior or address game protection problems.

[0109] In this embodiment, before or during game play, emotional state evaluator 415 is configured to output its determined measure of the emotional state of the player to game controller 105. Game controller 105 can be configured or controlled to modify game play according to that determined emotional state.

[0110] Figure 8 is a schematic view of a particular example of a piece of auxiliary game equipment, in the form of a bendable smart playing card 500 according a particular aspect of the present invention. In broad terms, smart playing card 500—which may be used with gaming system 100 and communicate with game controller 105 thereof—allows a player to flex or ‘squeeze’ smart playing card 500 so as to experience something comparable to the experience of squeezing a real playing card. The extent of any flexing and any rotation is detected by smart playing card 500, and transmitted—via wireless or wired communications—to a controller (such as game controller 105). That information can be used, for example, to control an on-screen animation of a playing card 500 (such as utilizing a 3D application such as Unity3D), so that the extent of squeeze and/or the rotational orientation of smart playing card 500 is reflected by the animation.

[0111] Figure 9 is an exploded schematic view of smart playing card 500. Smart playing card 500 includes a front face 502 and a rear face 504. Front face 502 is a flexible electronic paper display (such as of the type provided by E Ink Corporation). Rear face 504 is advantageously of a flexible plastics material, and which may if desired be provided with—for example—an abstract design (as many be found on the back of a playing card) or a company logo.

[0112] Between front face 502 and rear face 504 there is provided one or more flex sensors 506, in this example in the form of four elongate flex sensors 506a–506d arranged so as to generally radiate from a magnet 508 located centrally

within smart playing card 500.

[0113] Smart playing card 500 includes a middle layer 510 that, in assembled form, is sandwiched between front face 502 and rear face 504; middle layer 510 is provided with slots or recesses to receive the one or more flex sensors and the magnet, and thereby secure the one or more flex sensors and the magnet in their desired positions. Middle layer 510 is preferably made from plastic, or any other flexible material.

[0114] Smart playing card 500 also includes a local controller 512 (such as an Arduino (trade mark) controller board), configured to receive data from one or more flex sensors 506 and to send that data to a remote controller (such as game controller 105). Local controller 512 also receives a randomly generated card image or card image information from the remote controller (such as game controller 105), and passes it to front face 502 for display thereby to a player. Smart playing card 500 thereby assumes the identity of the randomly generated card, and the player is able to see what card he or she is holding.

[0115] Local controller 512 is powered by a built-in battery, USB wired connection from the remote controller or by wireless charging. Local controller 512 includes a WIFI module or USB wired connections to send data to and receive data from the remote controller. Local controller 512 also has a compass module (enabled in the wireless version) to detect the rotation value of smart playing card 500 in the Y-axis (top-down) when a player changes the angle of the card on the table, and these coordinates—once transmitted to the remote controller—allow the 3D application to mimic that rotation in the on-screen animation.

[0116] The one or more flex sensors 506 generate resistance rates when smart playing card 500 is being bent or flexed; these rates are sent to local controller 512 in order to be converted to the byte array format and then be sent to the remote controller. Flex sensors 506 generate these resistance rates individually, or in combination with more than one sensor at a time.

[0117] For example, in the present example of four flex sensors as depicted in figure 9, a first sensor 506a generates the resistance rate from the top-left point

to the center point of magnet 508; a second sensor 506b generates the resistance rate from the top-right point to the center point of magnet 508; first and second sensors 506a, 506b generate two resistance rates from top point to center point (at magnet 508) at a time. Local controller 512 is configured to send these rates to the remote controller, which can be configured to translate them to coordinates in the 3D application and thereby to animate the card's bending from different angles. There are, if four flex sensors are employed, $4 \times 3 \times 2 \times 1 = 24$ possible ways of arranging four directions of four sensors. Sensors 506a–506d are connected to local controller 512 by respective interface points located on local controller 512.

[0118] Magnet 508 is optional, but facilitates connection between local controller 512 and the one or more flex sensors 506. That is, magnet 508 is detachable allowing the ready exchange of any of rear face 504, flex sensors 506, magnet 508, middle layer 510 and front face 502) if damaged in use or otherwise. This allows repairs to be effected should only one or more of these parts require replacement. Magnet 508, if employed, can also be used to provide the connection between local controller 512 via middle layer 510 to display the card images on front face 502.

[0119] Figure 10 is a photograph of a prototype 520 of several of the principal components of such a smart playing card. Prototype 520 includes a programmable logic controller board 522, a flexible electronic paper display 524 (cf. front face 502 of smart playing card 500) and connector 526 connecting controller board 522 to electronic paper display 524. While a wired connection is shown between connector 526 and controller board 522, it will be apparent to the skilled person that connector 526 may also be wirelessly connected to controller board 522.

[0120] Figure 11 is a flow diagram overview of a method according an embodiment of the present invention of using a gaming system that includes at least one player terminal, a dealer terminal and a controller—such as gaming system 100. A player or players use the gaming system via the player terminal or terminals; a dealer uses the gaming system via the dealer terminal; and a systems administrator uses the gaming system via the controller. The method

includes the following steps, which refer to one player for illustrative purposes. It will be appreciated, however, that a plurality of players may participate.

[0121] At step 602, a player's account is created on the gaming system by either a systems administrator or the player. The player account is stored in a database (such as database 106), and may include player information such as personal information and player identifier, and player account details such as credit amount, player category, and/or total commissions.

[0122] Optionally, step 602 includes providing the player with a player card for use with the player terminal, such as to log in or otherwise activate the system via card reader 214.

[0123] At step 604 (which is optional), the player logs into the gaming system via facial recognition, such as using a player camera 211. As mentioned above, the player may log in using the player card, such as via card reader 214. For additional security, step 604 may include the player's logging in via both facial recognition and a player card.

[0124] At step 606, the player inputs a game selection using the player terminal, such as via player input 212. In this step, the player may also select between dealer types, including 'standard' or 'virtualized'. Optionally, the player inputs preference settings, such as his or her selection with respect to a virtualized dealer, and a dealer background (the latter being applicable to both standard and virtualized dealer modes). Also optionally, the player allows default states to load, or for a previously saved state to load, such as from a CRM system 416.

[0125] Optionally, step 608 (shown in this example after step 606 but in fact at any time before, during, or after a game), the player enables or disables lucky charms on the player terminal, such as via player input 212, and selects select lucky charm preference settings.

[0126] At step 610, the dealer accesses the gaming system via the dealer terminal, such as dealer terminal 103. The dealer may optionally do or otherwise set up motion capture equipment, such as via motion capture system

313. Typically, the dealer now positions him- or herself in view of a dealer camera, such as dealer camera 311, so that the player can view the dealer. The dealer may also, at this step, set up a green screen (cf. green screen 312). In this step, the dealer receives player information via dealer terminal (cf. dealer display 321).

[**0127**] At step 612, the player inputs a wager via the player terminal, (cf. player input 212) and, optionally, confirm a wager or a lack thereof.

[**0128**] At step 614, the dealer acknowledges with the dealer terminal that all bets are in and that the player is ready for the game to begin, such as via dealer display 321. The dealer may optionally receive game specific information, such as game speed.

[**0129**] At step 616, the dealer proceeds to electronically deal the game using the dealer terminal, which invokes an electronic game play generator such as game results generator 314. In an embodiment, the dealer deals the game using real game equipment. For example, in a card game, the dealer may deal cards via game results generator 314 which may take the form of an electronic card shoe. Initially, the cards are displayed face down to the dealer and to the player. In this step, the player observes the progress of the game progress via the player terminal, such as player display 221.

[**0130**] At step 618, the player advances the game either by requesting that the dealer reveal the game results, or by using an item of auxiliary game equipment (such as an electronic playing card). To request that the dealer reveal a game result, the player inputs a command via player terminal, such as player input 212. If the gaming system includes an item or items of auxiliary game equipment, the player may input a command via player terminal, preferably via player input 212, indicating that he or she will use the auxiliary game equipment. The player then uses the auxiliary game equipment, such as auxiliary game equipment 215.

[**0131**] For example, in a card game, the player may use auxiliary game equipment 215 to reveal a concealed card (i.e., to perform a card squeeze). The player may view an item of virtual game equipment on the player terminal,

preferably via player display 221. The player then uses the auxiliary game equipment to reveal the face value of the virtual game equipment. The player may view the physical change on auxiliary game equipment effected on the virtual game equipment. The player may then input a command to confirm that use of auxiliary game equipment is complete, such as via player input 212.

[0132] At step 620, the dealer acknowledges a prompt from dealer terminal, such as via dealer display 321, the prompt provided in relation to the player's actions in step 618. In an embodiment, the dealer then reveals the face value of the real game equipment, such as one or more cards.

[0133] In some embodiments, at step 622—which may optionally follow step 620 and before a full game result is revealed by the dealer—the gaming system receives one or more wager on insurance bets from the player via player terminal, such as via player input 212.

[0134] At step 624, the game result is displayed to the player on the player terminal, preferably player display 221, and the gaming system prompts the player to input his or her desire to continue (to play, for example, another hand) or to logout and stop. The player may also experience the haptic sequences via player haptics 222.

[0135] At step 626, the game system monitors for that input and, if it receives an input to the effect that play should continue, processing return to step 612. Otherwise, the player is logged out of the gaming system and processing ends. In some embodiments, the player removes his or her player card from the player terminal, such as from card reader 214.

[0136] In conclusion, various features of the invention as presented herein are advantageous over existing systems for at least some of the following reasons.

[0137] Improved Trust: the gaming system can facilitate increased trust between players and the casino/management. A high level of trust is required by premium players. The gaming system presented herein is in a form that may be implemented within the bounds of a land-based casino and present the benefits of previously known gaming systems in a manner suitable for the use by

premium players.

[0138] Increased Tracking Ability: the gaming system facilitates the accurate tracking of wagers and player movement between games. As a result, a land-based casino may choose to offer certain privileges, such as improved wagering options and improved commission programmes, to their premium players but, owing to the limitations inherent in existing systems, such privileges may not be offered in optimal form, especially to premium players. Improved wagering options include the option of insurance bets, and an improved high risk bet experience (high risk bets may include pair bets that may be an option for Baccarat games).

[0139] Insurance Bets: a casino may wish to offer the insurance bet option on any table game. Insurance bets are bets which become available to players in the course of a game based on certain triggering conditions, for example, a dealer's hand having an ace on the open-faced card in the game of Blackjack, for which the insurance bet is then offered to a patron for the eventuality that the dealer's hand is a blackjack, in which case the patron who takes the insurance bet will recover his original stake placed on the game. For manually dealt games, as the insurance bet becomes available only when the triggering conditions are met mid-game, the offering of the insurance bet is dependent on the dealer manually offering the said bet to players at the appropriate juncture. However, according to rules in some jurisdictions or casinos, the casino may be required to bear the complete liability to pay out to players who have not placed the insurance bet if, at the appropriate time, the players were not informed of the availability of the insurance bet option. The liability pay out includes the amount that would be paid as if the players had placed the insurance bet. This creates a sizable risk for the casino operators, more so when premium players are involved. As a result, it is not uncommon for casinos to simply choose not to make the insurance bet available in the games they run. The gaming system can be configured to ensure that players are informed of any available insurance bets (such as with a message displayed to players and requiring acknowledgement before play will commence), reducing the associated risk to a casino operator. A land-based casino implementing the gaming system thus has the ability to safely make available the various insurance bets in its games,

especially to premium players.

[0140] Dynamic Betting: the current gaming landscape with the predominantly manual nature of tracking the wagers and payouts made by / to players necessitates having a static betting system whereby the types of bets available and their corresponding payouts are fixed throughout the conduct of the game. Hence, tables on the casino floor advertise fixed bets, odds and/or payouts applicable to the game in question. The limitation of a static betting system necessarily introduces certain risks to the casino insofar as there may be certain betting options made available to the player which actually become more disadvantageous for the casino to offer as the conduct of the game progresses. An area where such a risk may eventualise are with high-risk bets, i.e., wagers which offer high payouts to players. Such wagers are termed “high-risk” from the casino’s perspective as they represent a probability where the casino would have to make a large payout to the winning player. An example of a “high-risk bet” would be the pair bet for the game of Baccarat. A key point to note is that the probability of these bets materialising (in the player’s favour) is not static throughout the game. As the game progresses, the probability may increase, thereby also increasing the risk to the casino.

Common workaround solutions may include casinos simply absorbing the associated risk or for casinos to put in place policies that attempt to prevent players from recording cards (effectively limiting a player’s ability to card count).

The gaming system 100 has a key advantage in that it allows for the casino to operate based on a dynamic system of betting which is able to react to the circumstances of any game currently in play. Using the example of the pair bet in Baccarat described above, the casino operator would be able to configure the betting system in a way that enables high risk bets to be adjusted as the game progresses, thereby managing the associated vulnerability to the casino. For example, the availability and/or payouts for pair bets in Baccarat could be adjusted when a predefined number of cards are left in the card shoe. Such adjustments could include removing the pair bet option for the remainder of the cards to be drawn, or reducing the payout odds for pair bet wagers as the vulnerability to the casino increases. A land-based casino implementing gaming

system 100 thus has the ability to offer an improved high risk betting experience, especially to premium players.

[0141] Gaming system 100 may optionally implement, such as with a rolling commission controller 418 within commission module 407, an improved commission programmes involving a rolling programme.

[0142] Special or varied commissions may be offered to players who have enrolled in a 'rolling programme'. Players who have enrolled in such a rolling programme are referred to as rolling players, and the bulk of such rolling players are typically premium players. In broad terms, the rolling programme involves a casino paying a commission to a player based on the amount that a player has wagered and lost. In a rolling programme, a player purchases a set of non-negotiable chips ("NN Chips"), also referred to as rolling chips to be used in placing wagers. NN Chips may be used for game wagers, but unlike normal casino cash chips, they cannot be exchanged for cash.

[0143] The player will bet using NN Chips. If the player wins, the winnings are paid in cash chips, and the NN Chips wagered by the player are returned to the player. Where the player loses the wager, the NN Chips are collected by the dealer. The player may choose to purchase more NN Chips at any time. At the end of the programme, the player returns all unwagered NN Chips to the casino.

[0144] The difference between the total NN Chips purchased and the total NN Chips returned by the player at the completion of the program is known as "rolling volume", or "net rolling turnover". Thus, the player's net rolling turnover = (value of NN Chips purchased) + (value of cash chips exchanged for NN Chips, that is, value of cash chips 'converted' to rolling chips) - (value of rolling chips returned). The commission paid to the player is a pre-agreed percentage based on the net rolling turnover, usually calculated only at the end of the programme or at certain pre-agreed intervals.

[0145] The commission payable to a player may be structured such that instead of a flat percentage commission, when the player's net rolling turnover exceeds a certain predefined threshold or volume, a different rate of rolling commission percentage may also apply.

[0146] Commission does not affect game play. However, the player can choose to open a cash program (where the player deposits his or her own funds before play and uses the funds from the deposit) or a credit program (where the player uses credit, or a combination of cash and credit). Accordingly, rolling commission rates may also be differentiated according to whether a patron is playing using his own funds or playing on credit that he has obtained from the casino. An example of rolling commission rates which are tiered and differentiate between cash play (player's own funds) and credit play is as follows:

Rolling volume range	Commission rate	
	cash play	credit play
0 – X	A%	A–n%
X+1 – Y	B%	B–p%
Y+1 – max	C%	C–q%

[0147] Currently the accurate tracking of rolling volume of individual players and administration of rolling programmes, is a manual process that consumes a large amount of operational resources. Accordingly, commission rates offered on rolling programmes are generally very simple with a flat percentage applied to the player's net rolling volume and a programme being solely cash play or credit play but not a combination.

[0148] Gaming system 100 allows accurate tracking of net rolling turnover / rolling volume of the individual player by casino management, making it straightforward to administer the rolling programmes for large numbers of participants. For example, it may be difficult for a land-based casino to efficiently and accurately record a player's on-going wagering activity in detail. For example, to facilitate the calculation of the player's rolling volume, a casino has to track every occasion where a player exchanges cash chips for rolling chips. Moreover, this has to be done over the entire period the player's rolling programme. Without the ability to track every wager (and the game results thereof) made by the player over an extended period of time, land-based casinos may find great difficulty in offering a rolling commission that suitably

reflects the true house edge of the player's gaming activities. As a result, a casino may choose not to offer a higher rolling commission for a player who chooses to wager heavily on bets which typically have a higher house edge. Gaming system 100 can efficiently and accurately track all wagering activity, so a land-based casino may choose to use gaming system 100 to offer improved commission programmes to rolling players. Since tracking is accurate and potentially real-time, it would be possible to also facilitate offering dynamic commission rates triggered based on specific scenarios or circumstances, e.g., a tiered commission rate applied to the first \$100,000 and another rate that applies to the next \$100,000 or a commission rate that increases if a player's wager exceeds a certain amount etc. Further, gaming system 100 can leverage the historic data collected on every player's bets, wager amount and game results, to identify groups of similar players and categorize them into 'bet profiles'. System 100 can match new players using machine learning capabilities against one or more of these bet profiles to better determine the appropriate commissions to be offered to them. Gaming system 100 is also able to utilize machine learning capabilities to identify changes in betting behaviour for entire bet profiles and/or for specific individual within each bet profile. Hence, gaming system 100 is able to continuously recategorize players to an appropriate bet profile and a system of alerts are available to the casino to confirm actions (such as changes in rolling commissions).

[0149] Hygiene and Sanitation: another benefit of the present invention is that of improved hygiene and sanitation, especially to premium players. In land-based casinos, it is difficult to maintain a hygienic environment considering there is direct contact between dealers and players, along with the physical handling of chips. Gaming systems in general may help with hygiene and sanitation, but known solutions may not be suitable for premium players. A land-based casino may offer improved hygiene and sanitation to premium players via the implementation of the gaming system of the present invention.

[0150] It will be understood to persons skilled in the art of the invention that many modifications may be made without departing from the scope of the invention, in particular it will be apparent that certain features of embodiments of the invention can be employed to form further embodiments.

[**0151**] It is to be understood that references to background art herein does not constitute an admission that such background art forms a part of the common general knowledge in the art in any country.

CLAIMS:

1. A gaming system, comprising:

at least one a player terminal, comprising a dealer viewing screen viewable by a player and a player input operable by the player;

at least one dealer terminal operable by a dealer;

a game controller configured to implement an at least partially electronic game; and

a controller in data communication with the player terminal, the dealer terminal and the game controller, wherein the controller comprises an emotional state evaluator configured to determine an emotional state of a player of the game;

wherein the controller is configured to:

control display on the dealer viewing screen a video of the dealer, a virtualized representation of the dealer, or a virtual dealer;

receive game play inputs from the player input; and

control the game controller to implement the game according to at least the game play inputs, and

wherein the game controller is configured to:

modify a game play of the game based on the determined emotional state of the player.

2. A gaming system as claimed in claim 1, wherein the dealer terminal comprises a camera configured to capture images of the dealer at or operating the dealer terminal.

3. A gaming system as claimed in claim 2, wherein the camera comprises a 2D-, 3D- or other video camera, and the controller receives a video feed from the

camera and controls the dealer viewing screen to display the video feed.

4. A gaming system as claimed in claim 1, further comprising:

(i) a camera configured to capture images of the dealer at or operating the dealer terminal, and a motion capture system configured to capture motion of a dealer, wherein the controller comprises a virtualizer configured to generate the video of the dealer by processing the output of the motion capture system, and to generate virtualized images of the dealer using at least an output of the motion capture system suitable for display on the dealer viewing screen; and/or

(ii) a virtual dealer generator configured to generate a virtual dealer suitable for display on the dealer viewing screen.

5. A gaming system as claimed in any one of the preceding claims, wherein the system is configured to display the dealer against a background on the dealer viewing screen, and the background is determined, generated, customizable or selected based on a received player input or player preferences.

6. A gaming system as claimed in any one of the preceding claims, wherein the player input and/or the player terminal comprises any one or more of:

a camera sensor, a touch sensor, a touch screen, a pressure sensor, a capacitive sensor, an inductive sensor, a light sensor, a temperature sensor, and a hand motion sensor.

7. A gaming system as claimed in any one of the preceding claims, further comprising at least one piece of auxiliary game equipment, configured to mimic the appearance and/or feel of a corresponding piece of standard game equipment and comprising one or more electronic sensors, wherein the sensors respond to manipulation of the auxiliary game equipment by outputting signals to the controller and the controller is configured to form a characterization of the manipulation from the signals.

8. A gaming system as claimed in claim 7, wherein the piece of auxiliary game equipment comprises a playing card that comprises one or more sensors.

9. A gaming system as claimed in claim 8, wherein the playing card further comprises a display, and the controller is configured to receive image data indicative of an image to be displayed on the display from the game controller and to control the display to display the image.

10. A gaming system as claimed in any one of the preceding claims, wherein the controller is configured to communicate with a message broker, wherein the message broker mediates data communication between the controller, the player terminal, the dealer terminal and the game controller.

11. A gaming system as claimed in any one of the preceding claims, wherein the controller further comprises:

a rolling commission controller configured to implement a rolling commission programme.

12. A gaming system as claimed in any one of claims 1 to 11, wherein the emotional state evaluator is further configured to build a library for the player correlating a likely emotional state with inputs from a face recognizer, a haptics module and a heart rate sensor.

13. A gaming system as claimed in any one of claims 1 to 11, wherein the emotional state evaluator is configured to determine the emotional state of the player from any one or more of:

- i) physiological inputs from a face recognizer;
- ii) physiological inputs from a haptics module;
- iii) physiological inputs from a heart rate sensor;
- iv) game results;
- v) historic and recent wagering behavior of the player;
- vi) game outcomes of the player; and
- vii) game play speed of the player.

14. A gaming system as claimed in any one of the preceding claims, further comprising at least one playing card that comprises one or more flex sensors, the playing card being configured to mimic the appearance and/or feel of a standard playing card, wherein the flex sensors respond to manipulation of the playing card by outputting signals to the controller, and wherein the controller is further configured to form a characterization of the manipulation of the playing card from the signals outputted by the flex sensors.

15. A gaming system as claimed in claim 14, wherein the playing card is flexible; and the flex sensors are located to detect flexing of the playing card.

16. A gaming system as claimed in claim 14 or 15, wherein the playing card further comprises:

(i) one or more accelerometers configured to output accelerometer signals indicative of an acceleration of the playing card to the controller; and/or

(ii) at least one gyroscope or other orientation sensor configured to output orientation signals indicative of an orientation of the playing card to the controller.

17. A gaming system as claimed in any one of claims 14 to 16, wherein the playing card is further configured to support wireless communication between the playing card and the controller.

18. A gaming system as claimed in any one of claims 14 to 17, wherein the playing card further comprises a compass sensor configured to output compass signals indicative of an orientation of the playing card to the controller.

19. A gaming system as claimed in any one of claims 14 to 18, wherein the playing card further comprises a wireless charging mechanism.

20. A gaming system as claimed in any one of claims 14 to 19, wherein the signals output by the playing card to the controller are configured or suitable to allow the controller to animate a simulation of the playing card.