Title: APPARATUS AND METHOD FOR VIRTUAL GOLF SIMULATION

Abstract: Disclosed herein are an apparatus and method for virtual golf simulation that is capable of providing various contents based on user history information of a user who has previously played golf through the virtual golf simulation apparatus during a virtual golf procedure through virtual golf simulation and enabling a user to play golf with the user, another user, or a virtual user acquired based on play information of a celebrity, thereby improving user convenience and inducing interest in virtual golf. The virtual golf simulation apparatus includes an image output unit for displaying a golf simulation image of a virtual golf course, a storage unit for storing user history information of a user who has played golf through the virtual golf simulation apparatus, and a controller for controlling at least one selected from a group consisting of a trajectory of a golf ball, a falling point of a golf ball, and a flight distance of a golf ball based on specific play information of the user history information to be displayed through the image output unit.
Description

Title of Invention: APPARATUS AND METHOD FOR VIRTUAL GOLF SIMULATION

Technical Field

The present invention relates to a virtual golf simulation apparatus, and, more particularly, to a virtual golf simulation apparatus wherein a virtual golf course is imaged and simulated, and the trajectory of a golf ball hit by a user, i.e. a golfer, is simulated in the virtual golf course.

Background Art

With the recent upsurge of the golfing population, a so-called screen golf system has gained popularity, which allows a golfer to practice golf and to enjoy a virtual golf game using a virtual golf simulation apparatus.

The screen golf system senses the velocity and direction of a golf ball that a golfer hits onto a screen installed indoors for displaying a virtual golf range, and displays the trajectory of the golf ball on the screen.

The screen golf system implemented using the virtual golf simulation apparatus characteristically offers the same sense of reality that a golfer would feel in a real golf course, when the golfer hits a golf ball in the same manner as in a golf practice range.

It is necessary for the virtual golf simulation apparatus to provide various contents based on various kinds of advanced apparatuses and systems, which cannot be provided by a real golf course or a golf practice range, thereby inducing interest of golfers in addition to provision of the same sense of reality that a golfer would feel playing a round of golf in a real golf course.

Disclosure of Invention

Technical Problem

Therefore, it is an object of the present invention to provide an apparatus and method for virtual golf simulation that is capable of providing various contents based on user history information of a user who has previously played golf through the virtual golf simulation apparatus during a virtual golf procedure through virtual golf simulation and enabling a user to play golf with the user, another user, or a virtual user acquired based on play information of a celebrity, thereby improving user convenience and inducing interest in virtual golf.

Solution to Problem

In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of a virtual golf simulation apparatus using user history information, including an image output unit for displaying a golf simulation.
image of a virtual golf course, a storage unit for storing user history information of a user who has played golf through the virtual golf simulation apparatus, and a controller for controlling at least one selected from a group consisting of a trajectory of a golf ball, a falling point of a golf ball, and a flight distance of a golf ball based on specific play information of the user history information to be displayed through the image output unit.

[8] In accordance with another aspect of the present invention, there is provided a virtual golf simulation apparatus for providing playing golf with a virtual user using user play information, including an image output unit for displaying a golf simulation image of a virtual golf course, a storage unit for storing user play information of the virtual user, and a controller for controlling playing golf between a user and the virtual user performed through the virtual golf simulation apparatus based on the user play information of the virtual user.

[9] In accordance with another aspect of the present invention, there is provided a virtual golf simulation method using user history information, including displaying a virtual golf play image and related information, extracting specific play information of a user from a storage unit which stores the user history information of the user who has played golf through the virtual golf simulation apparatus, and displaying at least one selected from a group consisting of a trajectory of a golf ball, a falling point of a golf ball, and a flight distance of a golf ball based on the extracted specific play information.

[10] In accordance with a further aspect of the present invention, there is provided a virtual golf simulation method for providing a game with a virtual user through a virtual golf simulation apparatus using user play information, including loading play information of the virtual user according to selection of a user, displaying a virtual golf play image and related information, and controlling the virtual golf simulation apparatus to perform playing of golf between the user and the virtual user based on the loaded play information.

**Advantageous Effects of Invention**

[11] In the virtual golf simulation apparatus and method according to the present invention as described above, it is possible to provide various contents based on user history information of a user who has previously played golf through the virtual golf simulation apparatus during a virtual golf procedure through virtual golf simulation and to enable a user to play golf with the user, another user, or a virtual user acquired based on play information of a celebrity. Consequently, the present invention has the effect of improving user convenience and inducing interest in virtual golf.

**Brief Description of Drawings**
The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a view illustrating a screen golf system to which a virtual golf simulation apparatus according to an embodiment of the present invention is applied;

FIG. 2 is a schematic block diagram illustrating a virtual golf simulation apparatus according to an embodiment of the present invention;

FIG. 3 is a view illustrating a screen golf system to which the virtual golf simulation apparatus shown in FIG. 1, having another example of a manipulation unit, is applied;

FIG. 4 is a view illustrating an external system connected to a virtual golf simulation apparatus according to an embodiment of the present invention;

FIG. 5 is a view illustrating a screen displaying shot information of all shots at a specific hole according to an embodiment of the present invention;

FIG. 6 is a view illustrating a screen displaying shot information of a specific shot according to an embodiment of the present invention;

FIG. 7 is a view illustrating an external system connected to a virtual golf simulation apparatus according to another embodiment of the present invention;

FIG. 8 is a flow chart illustrating a process of creating a virtual user in a virtual golf simulation apparatus according to another embodiment of the present invention;

FIG. 9 is a flow chart illustrating a virtual golf simulation method according to another embodiment of the present invention;

FIG. 10 is a view illustrating a screen displaying playing of golf between a user and a virtual user in a virtual golf simulation apparatus according to another embodiment of the present invention; and

FIG. 11 is a view illustrating a screen displaying playing of golf between a user and a virtual user in a virtual golf simulation apparatus according to a further embodiment of the present invention.

**Best Mode for Carrying out the Invention**

Now, exemplary embodiments of a virtual golf simulation apparatus and method according to the present invention will be described in detail with reference to the accompanying drawings.

First, a virtual golf simulation apparatus according to an embodiment of the present invention will be described in detail with reference to the accompanying drawings.

The virtual golf simulation apparatus according to the present invention may be embodied in various forms. Typically, the virtual golf simulation apparatus according to the present invention may be applied to a so-called screen golf system.

FIGS. 1 and 3 illustrate an example in which a virtual golf simulation apparatus
according to the present invention is applied to a screen golf system, to which, however, the present invention is not limited. For example, the present invention may be applied to all kinds of systems and/or apparatuses that are capable of simulating and imaging a virtual golf course and simulating a virtual golf ball image.

As shown in FIGS. 1 and 2, a virtual golf simulation apparatus according to an embodiment of the present invention includes a swing plate 20, a sensing device 8, an image output unit P for outputting a predetermined image to a screen C disposed in front of the image output unit P, and a simulator for storing and processing all data necessary for virtual golf simulation. In this embodiment, the simulator is mounted in a protection box 10 as shown in FIG. 1.

The simulator may include an image processing unit D, a storage unit T and a controller M.

The storage unit T stores all data necessary for virtual golf simulation including data on a virtual golf course. The image processing unit D is provided to process all images related to virtual golf simulation, such as images related to a virtual golf course, images related to movement of a golf ball, and images for menu selection, as data stored in the storage unit T. In this embodiment of the present invention, the storage unit T stores user history information of a user who has played a round of golf through the virtual golf simulation apparatus. Here, the user history information includes shot information of a user who has played a round of golf in a specific golf course. The shot information includes shot directions, shot distances, and shot results. For example, the shot information may indicate that, at a first hole of a specific golf course, a golf ball has flown 210 m in the left direction of a fairway as the result of a first tee shot, the golf ball has reached a bunker at the right side of a green as the result of a second shot, the golf ball has reached a point of the green which is 15 m distance from a hole cup (i.e. on green), and the golf ball has reached a point of the green which is 0.85 m distance from the hole cup at the right side of the hole cup, which has been conceded, with the result that a user has completed playing golf at a par 4 hole as a bogie. The user history information, including shot information from a first hole to an eighteenth hole, is stored. Also, the user history information cumulatively stores all kinds of information on a procedure which has been performed in a specific hole.

The controller M is provided to perform various calculations for virtual golf simulation and to control components of the virtual golf simulation apparatus. If a user selects the user history information while an image is displayed on the screen C by the virtual golf simulation apparatus, the controller M controls the user history information stored in the storage unit T to be displayed. Here, the user history information may be selectively or simultaneously displayed on the screen C and a monitor 40, which is an auxiliary screen. That is, if a user wishes to know shot information of shots which the
user had previously hit before the user hits each shot, the user may display the user history information on the image in which golf is being currently played through the manipulation unit O so as to confirm his/her course management.

When a golfer hits a golf ball on the swing plate 20 to the screen C, the sensing device S senses the shot of the golf ball, and transmits the sensing result to the controller M. The controller M transmits the sensing result to the image processing unit D. The image processing unit D extracts golf simulation image information, such as a movement image of the golf ball, from the storage unit T in consideration of movement properties of the golf ball. The golf simulation image information is projected on the screen C through the image output unit P so that a golf game through virtual simulation is performed.

Although not clearly shown in FIG. 1, the sensing device S (see FIG. 2) may be embodied by an infrared light transmitting and receiving sensor mounted at the swing plate 20 or a camera sensor mounted at the ceiling or the wall. In addition, the sensing device S may be embodied by other different sensors.

Meanwhile, the virtual golf simulation apparatus according to this embodiment of the present invention further includes a manipulation unit O for allowing a golfer to manipulate a system setting or various kinds of settings necessary to perform a virtual golf game.

FIG. 1 illustrates a keyboard 11 provided in the protection box 10, in which the simulator is mounted, as an example of the manipulation unit O. A touch screen 30 mounted at a side wall W of a booth may be provided as an example of the manipulation unit. Also, although not shown, a mouse is preferably provided together with the keyboard 11. In this embodiment of the present invention, a user may access an external system through the manipulation unit O or display the user history information.

Meanwhile, although not shown, a remote control (not shown) may be provided as the manipulation unit so that the remote control can directly communicate with the simulator or the touch screen to manipulate virtual golf simulation.

Meanwhile, FIG. 3 illustrates a key manipulation unit 22 provided at the swing plate 20 as another example of the manipulation unit.

That is, it may be inconvenient for a golfer standing on the swing plate 20 to manipulate the keyboard 11 or the touch screen 30 shown in FIG. 1. For this reason, the key manipulation unit 22 is preferably provided at the swing plate 20 for allowing a golfer who is ready to swing on the swing plate 20 to conveniently manipulate settings for virtual golf simulation.

FIG. 4 is a view illustrating an external system connected to a virtual golf simulation apparatus according to an embodiment of the present invention.
Referring to FIG. 4, the external system 200 is connected to the virtual golf simulation apparatus 100 via a communication network, i.e. the Internet. The external system 200 may be connected to an information terminal 110. Upon completion of a round of golf played by a specific user, the virtual golf simulation apparatus 100 transmits shot information of shots which the user had hit at every hole of the previously specific course to the external system 200. The external system 200 stores user history information per user and per specific course in a user database 230. The user history information is accumulated based on the number of rounds of golf which the user has played and is stored in a database. A user connection unit 220 is connected to the virtual golf simulation apparatus 100 and the information terminal 110. The user connection unit 220 transmits the user history information to the virtual golf simulation apparatus 100 under control of a central processing unit 210.

Upon receipt of login information of a specific user from the virtual golf simulation apparatus 100, the external system 200 extracts user history information of the specific user from the user database 230 and transmits the extracted user history information to the virtual golf simulation apparatus 100. Also, when a specific golf course is selected by the virtual golf simulation apparatus 100, the external system 200 may extract user history information at the specific golf course from the user database 230 and transmit the extracted user history information to the virtual golf simulation apparatus 100.

The virtual golf simulation apparatus 100 stores the user history information received from the external system 200 in the storage unit T. Before golf is played at a corresponding hole requested or selected by a user, shot information of shots which have been hit at all holes is displayed, or the user history information in the sequence of specific shots at a specific hole is displayed together with a play image which is currently being displayed. The user history information may be displayed on the main screen or on the auxiliary monitor.

Also, the user history information may be displayed in the play image on the main screen. Alternatively, the user history information may be displayed through a mini map. The mini map has a downscaled image of a virtual golf course displayed in a predetermined region of the main screen.

FIG. 5 is a view illustrating a screen displaying shot information of all shots at a specific hole according to an embodiment of the present invention.

Referring to FIG. 5, when a user wishes to know how the user had played golf at a specific hole, for example at a third hole of par 4, in a specific golf course before the user plays golf at the corresponding hole, the user may push a specific key button to display shot information of shots which the user had hit on the screen. Through this course management, it is possible for the user to know that a second shot hit by the user had fallen into a bunker around a green with the result that the user had completed
playing golf as a bogie. Consequently, the user may play golf at this hole while being careful with the bunker around the green.

[46] Shot information of all the shots based on the previous user play information may be displayed in the golf simulation image or in the mini map image displayed at a predetermined region of the golf simulation image.

[47] FIG. 6 is a view illustrating a screen displaying shot information of a specific shot according to an embodiment of the present invention.

[48] Referring to FIG. 6, before a user hits a specific shot, i.e. a first tee shot, at a specific hole, the user may know a direction in which the user's previous tee shot flew at this hole. As shown in the drawing, it can be seen that the user's tee shots were hooked, i.e., the shots were curved much in the left direction, the previous three times. Therefore, the user may recognize that it is necessary to hit a tee shot while aiming at the right side of a fairway so as to reduce the occurrence of incorrect shots based on such information. Such user history information may be displayed on the main screen, on the mini map or on the auxiliary monitor by the user pushing a specific key or manipulation button before hitting a shot. Therefore, the user may know that hitting a tee shot at a current hole in a general manner, for example, hitting a tee shot toward the middle of the fairway, is not suitable for the user but it is suitable the user to hit a tee t shot while aiming to the right side of the fairway in consideration of the user's previous shot directions, thereby reducing the occurrence of incorrect shots.

[49] Also, the user history information shown in FIG. 6 includes the direction. However, the flight distance or the result of the tee shot, for example, whether the hit golf ball has entered an out of bound (OB) area, a rough or a fairway, may also be displayed. These kinds of information may serve as important reference materials in history information of a user who is currently playing golf.

[50] FIG. 7 is a view illustrating an external system connected to a virtual golf simulation apparatus according to another embodiment of the present invention;

[51] Referring to FIG. 7, the external system 200 is connected to the virtual golf simulation apparatus 100 via a communication network, i.e. the Internet. The external system 200 may be connected to an information terminal 110.

[52] The external system 200 includes a central processing unit 210, a user connection unit 220, a first virtual user creation part 240, a second virtual user creation part 250, and a virtual user storage part 260. If play information of a user playing golf through the virtual golf simulation apparatus 100 satisfies a predetermined condition, the external system 200 creates a virtual user based on the play information.

[53] Also, the external system 200 creates a virtual user based on play information of another user. Here, the virtual user created on the previous play information of the user is defined as first virtual user information, and the virtual user created on the play in-
formation of another user is defined as second virtual user information.

Upon completion of golf played by a user through the virtual golf simulation apparatus 100, the first virtual user information is transmitted to the central processing unit 210 via the user connection unit 220. The central processing unit 210 determines whether the play information of the user satisfies predetermined conditions. Specifically, the central processing unit 210 determines whether the user has logged into the virtual golf simulation apparatus 100, in which playing mode the user has played golf, i.e. whether the playing mode has been a stroke mode, and whether a hole(s) has been skipped during playing a round of golf, i.e., the user has normally completed playing golf at eighteen holes. If such conditions are satisfied, the first virtual user creation part 240 creates first virtual user information based on the play information of the user and stores the created first virtual user information in the virtual user storage part 260.

The second virtual user information is created based on play information of another user, for example, an existing specific professional golfer, who has really played golf in a corresponding golf course. Alternatively, play information of a celebrity, such as a well-known entertainer or a politician, who has played golf through the virtual golf simulation apparatus 100 is determined in the same manner as in the first virtual user creation conditions as previously described. If the conditions are satisfied, the second virtual user creation part 250 creates the second virtual user information. Here, image information and voice information of the celebrity may be added to the play information of the celebrity and then included in the second virtual user information. The created second virtual user information is stored in the virtual user storage part 260.

When a user accessed the external system 200 through the virtual golf simulation apparatus 100 requests playing golf with a virtual user, i.e. a virtual user mode, the external system 200 extracts the first virtual user information or the second virtual user information of the corresponding user from the virtual user storage 260 and transmits the extracted first virtual user information or the extracted second virtual user information to the virtual golf simulation apparatus 100 via the user connection unit 220. The virtual golf simulation apparatus 100 stores the received first virtual user information or the received second virtual user information in the storage unit T and controls playing of golf between the user and the virtual user.

FIG. 8 is a flow chart illustrating a process of creating a virtual user in a virtual golf simulation apparatus according to another embodiment of the present invention.

Referring to FIG. 8, when playing of golf using the virtual golf simulation apparatus is completed at Step 500, the replay result is displayed at Step 502. Here, a menu for asking a user if a virtual user is to be created may be provided. At Step 504 to 508, conditions indicating whether the virtual user can be created are determined. That is, it
is determined how many times holes have been skipped, whether the user has played
golf after login, and whether the user has played golf in a stroke play mode. This is
because it is not possible to create play of the corresponding user or a celebrity for
every shot if the user does not play golf in the stroke play mode. If the conditions of
Step 504 to 508 are satisfied, storage of a virtual user is activated at Step 510, and the
virtual user is stored at Step 512.

FIG. 9 is a flow chart illustrating a virtual golf simulation method according to
another embodiment of the present invention.

Referring to FIG. 9, playing of golf using the virtual golf simulation apparatus is
started at Step 600. At Step 602, a user selects a virtual user mode. At Step 604, a
virtual user of the corresponding user is extracted from the virtual golf simulation
apparatus. At Step 606, playing of golf between the user and the virtual user is
performed.

FIG. 10 is a view illustrating a screen displaying playing of golf between a user and a
virtual user in a virtual golf simulation apparatus according to another embodiment of
the present invention.

Referring to FIG. 10, after a user hits a shot at a specific hole, the figure of a virtual
user 700 who hits a tee shot is output to a screen. Here, the virtual user 700 may be an
image of the user who has really played golf or an image of a celebrity. Also, flight
directions of a golf ball are displayed after the virtual user impacts the golf ball. That is,
in a case in which the virtual user is created based on play information of the user who
has previously played golf, the direction, the distance, and the falling point of the tee
shot are decided in advance, and the figure of the virtual user performing a golf swing
may be displayed on the screen as shown in FIG. 10. The figure of the user who has
previously performed a golf swing may be captured and displayed. Alternatively, the
figure of the user may be imaged and displayed as a specific character.

If the virtual user is a celebrity, the figure or voice of the celebrity may be displayed
on the way of playing golf. Also, flight lines of golf balls hit by the virtual user and the
real user may be displayed using different colors or shapes so as to distinguish between
the advancing direction of the golf ball hit by the virtual user and the advancing
direction of the golf ball by the real user.

FIG. 11 is a view illustrating a screen displaying playing of golf between a user and a
virtual user in a virtual golf simulation apparatus according to a further embodiment of
the present invention.

Referring to FIG. 11, a dotted line indicates a flight line of a golf ball hit by a real
user, and a solid line indicates a flight line of a golf ball hit by a virtual user, i.e.
another user (celebrity).

Expressions of playing golf of the virtual user described with reference to FIGS. 10
and 11 are not limited to the above-described fashions but may be embodied in various fashions.

**Mode for the Invention**

[67] Various embodiments of an apparatus and method for the virtual golf simulation have been described in the best mode for carrying out the invention.

**Industrial Applicability**

[68] In the apparatus and method for the virtual golf simulation according to the present invention as described above, it is possible to provide various contents based on user history information of a user who has previously played golf through the virtual golf simulation apparatus during a virtual golf procedure through virtual golf simulation and to enable a user to play golf with the user, another user, or a virtual user acquired based on play information of a celebrity, thereby improving user convenience and inducing interest in virtual golf. Consequently, the present invention can be widely used in industries related to the apparatus and method for the virtual golf simulation.
Claims

[Claim 1] A virtual golf simulation apparatus using user history information, comprising:
an image output unit for displaying a golf simulation image of a virtual golf course;
a storage unit for storing user history information of a user who has played golf through the virtual golf simulation apparatus; and
a controller for controlling at least one selected from a group consisting of a trajectory of a golf ball, a falling point of a golf ball, and a flight distance of a golf ball based on specific play information of the user history information to be displayed through the image output unit.

[Claim 2] The virtual golf simulation apparatus according to claim 1, wherein the trajectory of the golf ball is based on shot information of shots which the user had hit in a previous specific golf course.

[Claim 3] The virtual golf simulation apparatus according to claim 1, wherein the trajectory of the golf ball is based on shot information of shots which another user had hit in a golf course in which the user is to play golf.

[Claim 4] The virtual golf simulation apparatus according to claim 1, wherein the image output unit is configured to display a mini map having a downscaled image of the virtual golf course displayed in a predetermined region of the golf simulation image, and the controller is configured to control the trajectory of the golf ball to be displayed in at least one of the golf simulation image and the mini map image.

[Claim 5] The virtual golf simulation apparatus according to claim 1, wherein the image output unit is configured to display a mini map having a downscaled image of the virtual golf course displayed in a predetermined region of the golf simulation image, and the controller is configured to control the trajectory of the golf ball to be displayed as the golf simulation image and to control the falling point of the golf ball to be displayed on the mini map.

[Claim 6] The virtual golf simulation apparatus according to claim 1, wherein the trajectory of the golf ball is cumulatively displayed based on the number of shots which the user had hit in a specific golf course.

[Claim 7] The virtual golf simulation apparatus according to claim 1, further comprising:
a manipulation unit for allowing the user to manipulate specific in-
formation, wherein
the controller is configured to receive the user history information from
an external system and to control the received user history information
to be stored in the storage unit when the user logs into the virtual golf
simulation apparatus or when the user manipulate the information
through the manipulation unit.

[Claim 8] A virtual golf simulation apparatus for providing playing golf with a
virtual user using user play information, comprising:
an image output unit for displaying a golf simulation image of a virtual
golf course;
a storage unit for storing user play information of the virtual user; and
a controller for controlling playing golf between a user and the virtual
user performed through the virtual golf simulation apparatus based on
the user play information and the virtual user play information.

[Claim 9] The virtual golf simulation apparatus according to claim 8, wherein the
virtual user comprises first virtual user information created based on
golf play information which the user had played through the virtual golf
simulation apparatus.

[Claim 10] The virtual golf simulation apparatus according to claim 8, wherein the
virtual user comprises second virtual user information created based on
golf play information which another user had played through the virtual
golf simulation apparatus.

[Claim 11] The virtual golf simulation apparatus according to claim 10, wherein
the second virtual user information is created by adding at least one of
image information and voice information of the another user to the golf
play information.

[Claim 12] The virtual golf simulation apparatus according to claim 8, wherein the
controller controls real play image and voice information of the user
through the virtual golf simulation apparatus and play image and voice
information based on the stored virtual user play information to be
output.

[Claim 13] A virtual golf simulation method using user history information,
comprising:
displaying a virtual golf play image and related information;
extracting specific play information of a user from a storage unit which
stores the user history information of the user who had played golf
through the virtual golf simulation apparatus; and
displaying at least one selected from a group consisting of a trajectory
of a golf ball, a falling point of a golf ball, and a flight distance of a golf ball based on the extracted specific play information.

[Claim 14] The virtual golf simulation method according to claim 13, further comprising:
allowing the user to access an external system through user login;
receiving user history information from the external system; and
storing the received user history information.

[Claim 15] The virtual golf simulation method according to claim 13, wherein the displaying step comprises displaying the trajectory of the golf ball based on shot information in a sequence of shots of a golf course among the user history information in correspondence to the sequence of the corresponding shots in the corresponding golf course in which the user is to play golf.

[Claim 16] A virtual golf simulation method for providing a game with a virtual user through a virtual golf simulation apparatus using user play information, comprising:
loading play information of the virtual user according to selection of a user;
displaying a virtual golf play image and related information; and
controlling the virtual golf simulation apparatus to perform playing of golf between the user and the virtual user based on the loaded play information.

[Claim 17] The virtual golf simulation method according to claim 16, further comprising:
allowing the user to access an external system through user login;
receiving play information of the virtual user from the external system; and
storing the received history information of the virtual user.

[Claim 18] The virtual golf simulation method according to claim 17, wherein the external system creates a virtual user based on the play information when the play information of the user who had played golf through the virtual golf simulation apparatus satisfies a predetermined condition.
START

500 END PLAYING GOLF USING VIRTUAL GOLF SIMULATION APPARATUS

502 DISPLAY PLAY RESULT

504 NUMBER OF SKIPPED HOLES < 1?
   NO
   YES

506 LOGGED IN?
   NO
   YES

508 STROKE PLAY?
   NO
   YES

510 ACTIVATE STORAGE OF VIRTUAL USER

512 STORE VIRTUAL USER

END
START

START PLAYING GOLF USING VIRTUAL GOLF SIMULATION APPARATUS

SELECT VIRTUAL USER MODE

EXTRACT STORED VIRTUAL USER

PERFORM PLAYING GOLF BETWEEN USER AND VIRTUAL USER

END