

VIRTUAL OBJECT CONTROL METHOD AND APPARATUS, STORAGE MEDIUM, AND ELECTRONIC DEVICE

RELATED APPLICATION

[0001] The present disclosure claims priority to Chinese Patent Application No. 201910441241.2, entitled "METHOD AND APPARATUS FOR CONTROLLING VIRTUAL OBJECT, STORAGE MEDIUM, AND ELECTRONIC DEVICE" filed with the China National Intellectual Property Administration on May 24, 2019, which is incorporated herein by reference in its entirety.

FIELD OF THE TECHNOLOGY

[0002] The present disclosure relates to the computer field, and specifically, to control of a virtual object.

BACKGROUND OF THE DISCLOSURE

[0003] Generally, different game items or game abilities are provided for a virtual object in a scene of a racing game application. A trigger condition is further configured for the game items or the game abilities, to ensure fairness of a game. For example, a power meter is provided, and a threshold of power for triggering a game item or a game skill is set in the power meter.

[0004] During a game, power can be accumulated once for a game item or a game skill, which matches with a virtual object, only after the virtual object is controlled to perform a target action once. In other words, in conventional technology, the power in the power meter cannot reach the power threshold, unless the virtual object is controlled to repeat the target action for multiple times to accumulate the power. Hence, the virtual object under control is authorized to use the game item or activate a game skill, in a case that the power in the power meter reaches the power threshold.

SUMMARY

[0005] A method and an apparatus for controlling a virtual object, a storage medium, and an electronic device are provided according to embodiments of the present disclosure, so as to address at least a technical issue of complex operations when controlling a virtual object in conventional technology.

[0006] A method for controlling a virtual object is provided according to an aspect of embodiments of the present disclosure. The method is performed by an electronic device, and includes: obtaining a first operation instruction when a virtual object controlled by a client is performing an acceleration operation, where the first operation instruction is configured to instruct controlling the virtual object to perform a first target action; obtaining a second operation instruction within a first target time period after the first target action is completed, where the second operation instruction is configured to instruct controlling the virtual object to perform a second target action; adjusting movement of the virtual object from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action, where a first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state; and adjusting an acceleration-control key corresponding to the acceleration operation to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0007] An apparatus for controlling a virtual object is further provided according to another aspect of embodiments of the present disclosure. The apparatus includes: a first obtaining unit, configured to obtain a first operation instruction when a virtual object controlled by a client is performing an acceleration operation, where the first operation instruction is configured to instruct controlling the virtual object to perform a first target action; a second obtaining unit, configured to obtain a second operation instruction within a first target time period after the first target action is completed, where the second operation instruction is configured to instruct controlling the virtual object to perform a second target action; a first control unit, configured to adjust movement of the virtual object from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action, where a first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state; and a second control unit, configured to adjust an acceleration-control key corresponding to the acceleration operation to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0008] A storage medium is further provided according to another aspect of embodiments of the present disclosure. The storage medium stores a computer program. The computer program when executed is configured to perform the foregoing method for controlling the virtual object.

[0009] An electronic device is further provided according to another aspect of embodiments of the present disclosure. The electronic device includes a memory, a processor, and a computer

program stored in the memory and executable on the processor. The processor performs the foregoing method for controlling the virtual object through the computer program.

[0010] A computer program product is further provided according to another aspect of embodiments of the present disclosure. The computer program includes instructions. The instructions, when executed on a computer, configure the computer to perform the foregoing method for controlling the virtual object.

[0011] In embodiments of the present disclosure, when the virtual object is performing the acceleration operation, the movement of the virtual object is controlled to be adjusted from the first state to the second state within the second target time period after the second target action starts, in a case that the second operation instruction configured to instruct performing the second target action is obtained within the first target time period after the first target action is completed. Thereby, the virtual object starts to collect power based on the second power corresponding to the second state. The power collected by the virtual object per unit time is increased by using the foregoing control logic, improving efficiency of power collection. Hence, a waiting time for re-activating the acceleration-control key is shortened, and it is unnecessary to repeat a target action for excessive times to collect power. Control operations on the virtual object are simplified and less complicated. Addressed is the technical issue of complex operations when controlling a virtual object in conventional technology.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings described herein are used to provide a further understanding of the present disclosure, and constitutes part of the present disclosure. Exemplary embodiments of the present disclosure and descriptions thereof are intended to explain the present disclosure, and do not constitute any inappropriate limitation to the present disclosure. The drawings are as follows.

[0013] Figure 1 is a schematic diagram of a network environment of a method for controlling a virtual object according to an embodiment of the present disclosure;

[0014] Figure 2 is a schematic diagram of a hardware environment of a method for controlling a virtual object according to an embodiment of the present disclosure;

[0015] Figure 3 is a flowchart of a method for controlling a virtual object according to an embodiment of the present disclosure;

[0016] Figure 4 is schematic diagrams of a method for controlling a virtual object according to an embodiment of the present disclosure;

[0017] Figure 5 is a schematic diagram of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0018] Figure 6 is a schematic diagram of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0019] Figure 7 is schematic diagrams of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0020] Figure 8 is a schematic diagram of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0021] Figure 9 is a flowchart of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0022] Figure 10 is a schematic diagram of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0023] Figure 11 is a schematic diagram of another method for controlling a virtual object according to an embodiment of the present disclosure;

[0024] Figure 12 is a schematic structural diagram of an apparatus for controlling a virtual object according to an embodiment of the present disclosure; and

[0025] Figure 13 is a schematic structural diagram of an electronic device according to an embodiment of the present disclosure.

DESCRIPTION OF EMBODIMENTS

[0026] In order to help those skilled in the art better understand solutions of the present disclosure, hereinafter technical solutions in embodiments of the present disclosure are described clearly and completely in conjunction with the drawings in embodiments of the present disclosure. Apparently, the described embodiments are only some rather than all of the embodiments of the present disclosure. Any other embodiments obtained based on the embodiments of the present disclosure by those skilled in the art without any creative effort fall within the scope of protection of the present disclosure.

[0027] In specification, claims, and drawings of the present disclosure, the terms "first", "second", and the like are intended to distinguish similar objects but do not necessarily indicate a specific order or sequence. It should be understood that data described in such manner is interchangeable where appropriate, so that embodiments of the present disclosure described herein may be implemented in an order other than that is illustrated or described herein. Moreover, the

terms "include", "comprise", and any other variants thereof are intended to cover non-exclusive inclusion. For example, a process, a method, a system, a product, or a device that includes a list of steps or units is not necessarily limited to these expressly listed steps or units, but may include another step or another unit that is not expressly listed or that is inherent to such process, method, system, product, or device.

[0028] A method for controlling a virtual object is provided according to an aspect of embodiments of the present disclosure. In an optional implementation, the method may be applied, applicable to, but is not limited, to a system for controlling a virtual object in a network environment as shown in Figure 1. The system for controlling the virtual object includes user equipment 102, a network 110, and a server 112. It is assumed that a client of a game application (a client of a racing game application, as shown in Figure 1) is installed on the user equipment 102. The user equipment 102 includes a human-computer interaction screen 104, a processor 106, and a memory 108. The human-computer interaction screen 104 is configured to detect a human-computer interaction operation (for example, a touch-control operation) via a human-computer interaction interface corresponding to the client. The processor 106 is configured to generate a corresponding operation instruction according to the human-computer interaction operation, and control a virtual object, which is controlled by the client, to perform a first target action or a second target action in response to the operation instruction. The memory 108 is configured to store the operation instruction and attribute information related to the virtual object. For example, the attribute information may include, but is not limit to, a state of movement of the virtual object and power in a power meter.

[0029] When a virtual object 100 controlled by the client installed on the user equipment 102 is performing an acceleration operation, a first operation instruction configured to instruct controlling the virtual object 100 to perform a first target action is obtained via the human-computer interaction screen 104, and a second operation instruction configured to instruct controlling the virtual object 100 to perform a second target action is obtained within a first target time period after the first target action is completed, as shown in steps S102 to S104.

[0030] Then, the processor 106 transmits the second operation instruction to the server 112 via the network 110, as shown in step S106. The server 112 includes a database 114 and a processing engine 116. The database 114 is configured to store state information of a first state and a second state, for example, a mapping relationship between the first state and a first power and a mapping relationship between the second state and a second power. The processing engine 116 is configured to control the virtual object 100 to perform the second target action according to the

received second operation instruction, and is configured to obtain a moment at which the second target action starts.

[0031] Then, the processing engine 116 in the server 112 controls, in response to the received second operation instruction and according to the mapping relationship stored in the database 114, to adjust movement of the virtual object 100 from the first state to the second state within a second target time period after the virtual object 100 starts to perform the second target action, as shown in step S108. The first power collected by the virtual object 100 per unit time in the first state is less than a second power collected by the virtual object 100 per unit time in the second state. Then, a value of the second power corresponding to the second state is transmitted to the user equipment 102 via the network 110, as shown in step S110. Afterwards, the processor 106 in the user equipment 102 collects power based on the second power, and the processor 106 adjusts a state of an acceleration-control key 118 corresponding to the acceleration operation to a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold, as shown in step S112.

[0032] In addition, in an optional implementation, the foregoing method for controlling the virtual object may alternatively be applied, but is not limited, to a hardware environment as shown in Figure 2. It is further assumed that a client of a game application (a client of a racing game application, as shown in Figure 2) is installed on the user equipment 102. The user equipment 102 includes the human-computer interaction screen 104, the processor 106, and the memory 108. The user equipment 102 performs the following steps through the processor 106. A first operation instruction configured to instruct controlling a virtual object 100 to perform a first target action is obtained via the human-computer interaction screen 104, and a second operation instruction configured to instruct controlling the virtual object 100 to perform a second target action is obtained within a first target time period after the first target action is completed, as shown in steps S202 to S204. Then, movement of the virtual object is controlled to be adjusted from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action, as shown in step S206. A first power collected by the virtual object 100 per unit time in the first state is less than a second power collected by the virtual object 100 per unit time in the second state. Afterwards, the virtual object 100 is controlled to collect power based on the second power, and a state of an acceleration-control key 118 corresponding to the acceleration operation is adjusted to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold, as shown in step S208.

[0033] When the virtual object is performing the acceleration operation, the movement of the virtual object is controlled to be adjusted from the first state to the second state within the second target time period after the second target action starts, in a case that the second operation instruction configured to instruct performing the second target action is obtained within the first target time period after the first target action is completed. Thereby, the virtual object starts to collect power based on the second power corresponding to the second state. The power collected by the virtual object per unit time is increased by using the foregoing control logic, improving efficiency of power collection. Hence, a waiting time for re-activating the acceleration-control key is shortened, and it is unnecessary to repeat a target action for excessive times to collect power. Control operations on the virtual object are simplified and less complicated. Addressed is the technical issue of complex operations when controlling a virtual object in conventional technology.

[0034] In an optional embodiment, the user equipment may be, but is not limited to, a computer device that supports execution of the application client, such as a mobile phone, a tablet computer, a notebook computer, or a PC. The server and the user equipment may, but is not limited to, perform data exchange with each other via the network. The network may include, but is not limited to, a wireless network or a wired network. The wireless network includes Bluetooth, Wi-Fi, or another network implementing wireless communication. The wired network may include, but is not limited to, a wide area network, a metropolitan area network, or a local area network. The foregoing description is merely an example, and this embodiment is not limited thereto.

[0035] In an optional implementation, the foregoing method for controlling the virtual object may be performed through an electronic device, and the electronic device may be the aforementioned user equipment and/or the aforementioned server. As shown in Figure 3, the method for controlling the virtual object includes following steps S302 and S308.

[0036] In step S302, a first operation instruction is obtained when a virtual object controlled by a client is performing an acceleration operation.

[0037] The first operation instruction is configured to instruct controlling the virtual object to perform a first target action.

[0038] In an optional implementation, duration of performing the first target action is less than a first threshold.

[0039] In step S304, a second operation instruction is obtained within a first target time period after the first target action is completed.

[0040] The second operation instruction is configured to instruct controlling the virtual object to perform a second target action.

[0041] In step S306, movement of the virtual object is adjusted from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action.

[0042] A first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state.

[0043] In step S308, a state of an acceleration-control key corresponding to the acceleration operation is adjusted to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0044] The steps of the method as shown in Figure 3 may be applied, but are not limited, to the system for controlling the virtual object as shown in Figure 1, and may be implemented through data exchange between the user equipment 102 and the server 112. The steps of the method as shown in Figure 3 may alternatively be applied, but are not limited, to the user equipment 102 as shown in Figure 2, and may be implemented by the user equipment 102 independently. The foregoing description is merely an example, and this embodiment is not limited thereto.

[0045] In an optional embodiment, the method for controlling the virtual object may be applied, but is not limited, to a game application, such as a racing game application. When a client of the game application is controlling a virtual object to perform an action combination of the first target action and the second target action, adjustment on the movement of the virtual object is triggered, such that efficiency of the virtual object obtaining a game item or a game skill is further adjusted.

[0046] In an optional embodiment, a power meter is usually provided for the virtual object in the racing game. Hence, a value of the accumulating power collected by a user controlling the virtual object can be intuitively displayed via the power meter, which is a visualized virtual image.

[0047] When increasing power collected per unit time in the power meter corresponding to the game item or the game skill, it may take less time for the accumulating collected power in the power meter to reach the trigger threshold. The virtual object may be, but is not limited to, an object such as a virtual role, virtual equipment, or a virtual vehicle controlled by a player in the racing game application. The first target action and the second target action may include, but are not limited to, a drifting action performed by the virtual object when passing a turn arranged in a game task. The first target action and the second target action may be, but are not limited to,

drifting actions toward a same direction. The foregoing description is merely an example, and this embodiment is not limited thereto.

[0048] Moreover, in this embodiment, the method for controlling the virtual object may be applied, but is not limited, to a special turn in a task of a racing game, such as a U-shaped turn or a V-shaped turn that is short and sharp. As shown in Figure 4(a), in a U-shaped turn 402 having an angle less than α_1 , a combination of the first target action and the second target action is performed according to a preset time condition, to trigger automatic adjustment on the movement of the virtual object. Thereby, the power collected per unit time is correspondingly adjusted. As shown in Figure 4(b), in a V-shaped turn 404 having an angle less than α_2 , a combination of the first target action and the second target action is performed according to a preset time condition, to trigger the automatic adjustment on the movement of the virtual object. Thereby, the power collected per unit time is correspondingly adjusted.

[0049] In this embodiment, when the virtual object is performing the acceleration operation, the movement of the virtual object is controlled to be adjusted from the first state to the second state within the second target time period after the second target action starts, in a case that the second operation instruction configured to instruct performing the second target action is obtained within the first target time period after the first target action is completed. Thereby, the virtual object starts to collect power based on the second power corresponding to the second state. The power collected by the virtual object per unit time is increased by using the foregoing control logic, improving efficiency of power collection. Hence, a waiting time for re-activating the acceleration-control key is shortened, and it is unnecessary to repeat a target action for excessive times to collect power. Control operations on the virtual object are simplified and less complicated.

[0050] Further, since the collection time is shortened, the state of the acceleration-control key corresponding to the acceleration operation may be adjusted more quickly to the state allowing touch control. A user may be prompted in various manners, for example, by switching the acceleration-control key from grey to multicolor, or re-rendering a texture of the acceleration-control key at a blank widget position. Thereby, the player is able to trigger a next acceleration control on the virtual object more quickly. It takes the virtual object less time to complete the current task of the racing game, and a chance winning such task is improved for the virtual object.

[0051] In an optional embodiment, a state of the movement may be configured, but is not limited, to indicate state(s) of force(s) applied on the virtual object during the movement. The

force(s) include a turning force for controlling the virtual object to complete a target action, and/or friction for preventing the virtual object from moving.

[0052] That is, the force applied on the virtual object is adjusted to change a speed of the virtual object in a game task. Thereby, the power collected per unit time, which is associated with the speed, is changed to reduce a time consumed by collecting the power. For example, the turning force on the virtual object is increased, and/or the friction on the virtual object is decreased, so that a lateral speed of the virtual object is increased, which increases the first power collected by the virtual object per unit time to the second power. In this way, the accumulating collected power (for example, displayed in the power meter) can reach the trigger threshold more quickly. Thereby, a state of the acceleration-control key that is configured to trigger the acceleration operation and corresponds to the power accumulation value is timely adjusted to be in the state allowing touch control, facilitating the player to triggering the next acceleration operation as soon as possible. Hence, a total time consumed by the virtual object for completing a game task is reduced, and a change of winning is improved for the virtual object in the game task.

[0053] In an optional embodiment, the target action may, but is not limited to, be implemented through a control key displayed in a human-computer interaction interface of the client. The control key may include, but is not limited to, a first control key configured to control a forward direction of the virtual object, and a second control key configured to trigger the virtual object to perform the target action. In a case that long-press operations are simultaneously performed on the first control key and the second control key, the target object is triggered to perform the target action once. The first control key may be, but is not limited to, direction control keys shown in Figure 5, such as a "left direction key" 502 and a "right direction key" 504. The second control key may be, but is not limited to, a trigger control key as shown in Figure 5, such as a "drift key" 506. Further, in this embodiment, the first target action and the second target action may be, but are not limited to, drifting actions toward the same direction. As an example, the first target action is a "drifting leftward" action triggered by long-press operations simultaneously performed on the "left direction key" 502 and the "drift key" 506, and correspondingly the second target action is also a "drifting leftward" action triggered by long-press operations simultaneously performed on the "left direction key" 502 and the "drift key" 506. As another example, the first target action is a "drifting rightward" action triggered by long-press operations simultaneously performed on the "right direction key" 504 and the "drift key" 506, and correspondingly the second target action is also a "drift-to-the-right action" triggered by long-press operations simultaneously performed on the "right direction key" 504 and the "drift key" 506.

[0054] Moreover, in this embodiment, before the virtual object obtains the first operation instruction, the method further includes following steps. An acceleration instruction generated from an operation on the acceleration-control key is obtained. The virtual object is controlled to perform the acceleration operation and enter an accelerating state, in response to the acceleration instruction. For example, as shown in Figure 6, after obtaining the acceleration instruction generated from a tap on the acceleration-control key 602, the virtual object is controlled to perform the acceleration operation and enter an accelerating state. In the accelerating state, the first operation instruction configured to instruct performing the first target action and the second operation instruction configured to instruct performing the second target action are obtained. Further, the movement of the virtual object is adjusted within a target time period after the second target action starts, so that a speed and an efficiency of power collection of the virtual object are improved.

[0055] Specific illustration is in conjunction with an example as shown in Figure 7. It is further assumed that a racing game application serves as an example. As shown in Figure 7(a), when an object (a virtual object 702 as shown in the figure) controlled by a client is executing a game task, an acceleration instruction is generated from a tap operation performed by a player on an acceleration-control key 602 in a human-computer interaction interface, and the acceleration-control key 602 is in a state allowing touch control. The acceleration instruction is detected, and the virtual object 702 is controlled to perform an acceleration operation and enter an accelerating state in response to the acceleration instruction. At the same time, the acceleration-control key is adjusted to be in a state not allowing touch control, as shown in Figure 7(b).

[0056] Further, as shown in Figure 7(b), when the virtual object 702 is in the accelerating state, a first operation instruction triggered by long-press operations on a "right direction key" and a "drift key" in the human-computer interaction interface is detected, and the virtual object 702 is controlled to perform a first target action, such as a drift-rightward action. Herein duration of performing the first target action is less than a first threshold. That is, after determining that the drift-rightward action is triggered, the "right direction key" and the "drift key" are quickly released to stop the long-press operations. Thereby, the virtual object 702 enters a state of passive drifting.

[0057] A drifting angle of the drift-rightward action corresponding to the first target action may be less than a preset angle threshold. For example, the angle is less than or equal to 10 degrees. The present disclosure is not limited thereto.

[0058] As shown in Figure 7(c), a second operation instruction triggered by long-press operations on the "right direction key" and the "drift key" in the human-computer interaction interface is detected again within a first target time period after the first target action is completed, and the virtual object 702 is controlled to perform a second target action, such as another drift-rightward action. Movement of the virtual object 702 is controlled to be adjusted from a first state to a second state within a second target time period after the virtual object 702 starts to perform the second target action (that is, the other drift-rightward action). Thereby, in a power meter corresponding to the acceleration-control key 602, power collected per unit time by the virtual object is adjusted from a first power to a second power, and the first power is less than the second power. As shown in Figure 7(d), the virtual object 702 after the adjustment collects power based on the foregoing second power. As shown in Figure 7(d), an identifier corresponding to the acceleration-control key being subject to a change of the power may present a state of the power collection. For example, efficiency of collecting the power in the power meter may be represented by a speed of recovering a color of the key identifier.

[0059] Further, as shown in Figure 8, after the first target action is completed, a track (a track 802 of the first target action) is displayed on a turn in the game, and a length of the displayed track 802 matches with the duration of performing the first target action. Further, after the second target action is completed, a track (a track 804 of the second target action) is further displayed, and a length of the displayed track 804 matches duration of performing the second target action. For example, the first target action may be a "cadence drift" action. That is, after determining that a drifting action is triggered, the control key(s) is quickly released such that the virtual object enters the state of passive drifting. Hence, the track 802 formed by the "cadence drift" action is short. Further, the second target action may be a "trailing drift" action. That is, a track 804 formed by such drifting action is long. A combination of the two target actions may also be labeled with a "cadence & trailing". After the process as shown in Figure 7 is completed, prompt information is displayed in the client in a case that a display condition is met, so as to prompt the user that "cadence & trailing" has been completed.

[0060] In addition, assuming that performing the action combination in this embodiment includes performing two drift-rightward actions, a flow of control logic of the method for controlling the virtual object may include, but is not limited to, following steps S902 to S912 as shown in Figure 9.

[0061] The steps S902 to S912 are as follows. A virtual object is controlled to perform an acceleration operation. A first operation instruction is obtained during such acceleration, to

control the virtual object to perform a drift-rightward action. Then, time counting starts after the drift-rightward action is completed. A second operation instruction is obtained within 0.5 seconds after the drift-rightward action is completed, to control the virtual object to perform another drift-rightward action. Movement of the virtual object is controlled to be adjusted within 0.2 seconds after the second drift-rightward action starts. For example, a turning force and/or friction are adjusted. Then, after such adjustment, power is collected based on a second power corresponding to a second state. Afterwards, prompt information is displayed, in a case that the action combination is completed and a display condition is met. For example, a player is prompted that a "cadence & trailing" action has been completed.

[0062] The foregoing embodiment takes 0.5 seconds, 0.2 seconds, and the prompt information of "cadence & trailing" as examples, and is not limited thereto.

[0063] In embodiments of the present disclosure, when the virtual object is performing the acceleration operation, the movement of the virtual object is controlled to be adjusted from the first state to the second state within the second target time period after the second target action starts, in a case that the second operation instruction configured to instruct performing the second target action is obtained within the first target time period after the first target action is completed, where the duration of executing the first target action is less than the first threshold. Thereby, the virtual object starts to collect power based on the second power corresponding to the second state. The power collected by the virtual object per unit time is triggered to be increased from the first power to the second power, by using the foregoing control logic, which improves efficiency of power collection. Hence, a waiting time for re-activating the acceleration-control key is shortened, and it is unnecessary to repeat a target action for excessive times to collect power. Control operations on the virtual object are simplified and less complicated. Addressed is the technical issue of complex operations when controlling a virtual object in conventional technology.

[0064] In an optional solution, adjusting the movement of the virtual object from the first state to the second state within the second target time period after the virtual object starts to perform the second target action includes following steps S1 and S2.

[0065] In step S1, a first value of a parameter is obtained, where the first value corresponds to a force applied on the virtual object in the first state.

[0066] In step S2, the first value of the parameter is adjusted to a second value of the parameter, where the second value corresponds to the second state.

[0067] In an optional embodiment, when adjusting the value of the parameter in the step S2, the first value may be adjusted to the second value based on a target ratio.

[0068] In this embodiment, a state of the movement may be configured, but is not limited, to indicate a state of force(s) applied on the virtual object in the movement. The force(s) on the virtual object during the game includes a forward force for driving the virtual object to move forward, and/or a turning force for controlling the virtual object to complete a target action, and further includes friction for preventing the virtual object from moving. The first value of the parameter may be, but is not limited to, a value of each force applied before the adjustment, and the second value of the parameter may be, but is not limited to, a value of each force applied after the adjustment.

[0069] In addition, the target ratio may be set as different values according to actual scenes, and this embodiment is not limited thereto.

[0070] In an optional embodiment, the step S2 of adjusting the first value of the parameter to the second value that corresponds to the second state includes following steps S21 and S22.

[0071] In step S21, in a case that the applied force includes the turning force, the first value of the parameter includes a first force-parameter value, and the second value of the parameter includes a second force-parameter value, the first force-parameter value of the virtual object is increased to the second force-parameter value based on a first target ratio. A direction of the turning force is perpendicular to a forward direction of the virtual object.

[0072] In step S22, in a case that the applied force includes the friction, the first value of the parameter includes a first friction-parameter value, and the second value of the parameter includes a second friction-parameter value, the first friction-parameter value of the virtual object is decreased to the second friction-parameter value based on a second target ratio.

[0073] A sequence of performing the steps S21 and S22 is not limited herein.

[0074] In this embodiment, when adjusting the movement of the virtual object, parameters of the turning force and/or the friction may be adjusted. The present disclosure is not limited thereto. For example, the turning force is increased, and/or the friction is decreased, so that magnitude of a lateral speed vector of the virtual object can be increased when performing the second target action, and thereby power collected per unit time is increased in the power meter.

[0075] Specifically illustration is made with reference to Figure 10 as an example, and it is assumed that the virtual object is a virtual vehicle. When the virtual vehicle is controlled to

perform the second target action (for example, another drift-rightward action), forces applied on the virtual vehicle includes a forward force 1002, a turning force 1004, and friction 1006.

[0076] Further, the movement of the virtual vehicle is controlled to be adjusted within the second target time period, for example, the turning force 1004 is increased and the friction 1006 is decreased in the adjustment. After the adjustment of the forces, greater acceleration is generated in both a direction perpendicular to a vehicle body and in a forward direction of the virtual vehicle. Hence, a lateral speed vector 1008 and a movement speed vector 1010 of the virtual vehicle are greatly increased. Correspondingly, the power collected per unit time, which is associated with the lateral speed vector, can be improved.

[0077] For example, it is assumed that the turning force on the virtual object is adjusted based on the first target ratio $a\%$.

[0078] $F_1 = F_0 \cdot (1 + a\%)$

[0079] $a\%$ is the first target ratio, $0 < a\% < 100\%$. F_1 is the second force-parameter value, and F_0 is the first force-parameter value.

[0080] It is assumed that the friction on the virtual object is adjusted based on the second target ratio $b\%$.

[0081] $f_1 = f_0 \cdot b\%$

[0082] $b\%$ is the second target ratio, $0 < b\% < 100\%$. f_1 is the second friction-parameter value, and f_0 is the first friction-parameter value.

[0083] According to embodiments of the present disclosure, parameters of the turning force and the friction are adjusted based on the target ratios, so as to adjust the virtual object from the first state to the second state. Hence, state adjustment on the virtual object can be triggered through the foregoing process of performing the actions. The power collected per unit time is automatically adjusted, and control operations on the virtual object are simplified.

[0084] In an optional solution, after adjusting the first value of the parameter to the second value corresponding to the second state based on the target ratio, the method further includes following steps S1 and S2.

[0085] In step S1, a lateral speed vector of the virtual object is determined based on the second value of the parameter. A direction of the lateral speed vector is perpendicular to a forward direction of the virtual object.

[0086] In step S2, the second power corresponding to the lateral speed vector is obtained.

[0087] In an optional embodiment, the step S2 of obtaining the second power corresponding to the lateral speed vector includes following steps S21 and S22.

[0088] In step S21, a square of a speed represented by the lateral speed vector is obtained.

[0089] In step S22, the second power is determined based on a value of the square. The second power is proportional to the value of the square.

[0090] In this embodiment, power collected per unit time in the power meter is proportional to the square of the magnitude of the lateral speed vector (hereinafter referred to as a lateral speed for short). For example, the unit time may be, but is not limited to, duration of displaying one frame in the game. That is, the power collected per unit time in the power meter may also be called "an amount of nitro collected per frame". For example, Figure 11 shows a relationship between the amount Q of nitro collected per frame and the square v^2 of the lateral speed.

[0091] That is, the lateral speed vector 1008 of the virtual object may be determined based on the second value of the parameter after the adjustment. Further, the power Q corresponding to the second state may be directly calculated based on the value of the square of the magnitude v of the lateral speed vector 1008.

[0092] For example, an equation for calculating the amount of collected nitro with respect to a point A is as follows.

[0093]
$$Q_A = k(v_A)^2$$

[0094] Q_A is a power obtained through the calculation when the lateral speed is equal to v_A . k is a coefficient required for the calculation, and the coefficient may be set as, but is not limited to, different values according to different scenes.

[0095] Further, in this embodiment, the acceleration-control key for triggering the acceleration operation is adjusted to be in a state allowing touch control, in a case that the power collected in the power meter reaches a trigger threshold. Thereby, the player may control the virtual object to perform the acceleration operation and enter the accelerating state again, by operating the acceleration-control key in the state allowing touch control again timely. Hence, a total time consumed by the virtual object to complete the game task is reduced, and a chance of winning the racing game is improved for the virtual object.

[0096] According to embodiments of the present disclosure, adjustment on the lateral speed of the virtual object is controlled through adjustment on the parameter of the force(s) applied on the virtual object. Thereby, power (the amount of nitro) collected per unit time, which is associated with the lateral speed, is also increased. It takes less time to fill the power meter with the power.

[0097] In an optional solution, after adjusting the movement of the virtual object from the first state to the second state, the method further includes following steps S1 and S2.

[0098] In step S1, a state of the virtual object performing the acceleration operation is obtained, in a case that duration of performing the second target action reaches a second threshold and a speed represented by the movement speed vector of the virtual object reaches a target threshold.

[0099] In step S2, prompt information is displayed in the client, in a case that the state indicates that the virtual object is in an accelerating state. The prompt information is configured to show that the virtual object has completed an action combination including the first target action and the second target action.

[0100] In this embodiment, the duration of performing the second target action needs to be monitored further after the virtual object is adjusted from the first state to the second state. In a case that the duration of performing the second target action reaches the second threshold and the movement speed vector (as shown in Figure 10, which may be called an instantaneous speed vector) of the virtual object reaches the target threshold, the state of the virtual object performing the acceleration operation is obtained, and it is determined according to such state whether to display the prompt information.

[0101] That is, the duration of performing the second target action may reach the second threshold, the movement speed vector of the virtual object may reach the target threshold, and the virtual object may be still in the accelerating state. At such time in this embodiment, the player may be prompted in the client that the action combination has been completed. For example, a "cadence & trailing" identifier is displayed, which indicates that the drifting actions, i.e. the "cadence drift" and the "trailing drift", have been completed.

[0102] According to embodiments of the present disclosure, the prompt information indicating that the action combination has completed is displayed, so as to show the user intuitively a result generated from the process of controlling the virtual object. Thereby, user experience is improved.

[0103] The foregoing method embodiments are described as a combination of a series of operations, for concise and brief description. Those skilled in the art shall appreciate that the present disclosure is not limited to the order of describing these operations, because some steps may be performed simultaneously or in another order according to embodiments of the present disclosure. In addition, those skilled in the art shall further appreciate that all embodiments

described in this specification are exemplary embodiments, and some actions and modules that are involved are not necessary to the present disclosure.

[0104] An apparatus for controlling a virtual object is further provided according to another aspect of embodiments of the present disclosure, for implementing the foregoing method. As shown in Figure 12, the apparatus includes a first obtaining unit 1202, a second obtaining unit 1204, a first control unit 1206, and a second control unit 1208.

[0105] The first obtaining unit 1202 is configured to obtain a first operation instruction when a virtual object controlled by a client is performing an acceleration operation. The first operation instruction is configured to instruct controlling the virtual object to perform a first target action.

[0106] The second obtaining unit 1204 is configured to obtain a second operation instruction within a first target time period after the first target action is completed. The second operation instruction is configured to instruct controlling the virtual object to perform a second target action.

[0107] The first control unit 1206 is configured to adjust movement of the virtual object from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action. A first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state.

[0108] The second control unit 1208 is configured to adjust an acceleration-control key corresponding to the acceleration operation to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0109] The apparatus as shown in Figure 11 may be applied, but is not limited, to the user equipment 102 and the server 112 in the system for controlling the virtual object as shown in Figure 1. The apparatus as shown in Figure 11 may alternatively be applied, but is not limited, to the user equipment 102 as shown in Figure 2. The foregoing description is merely an example, and this embodiment is not limited thereto.

[0110] In an optional embodiment, the method for controlling the virtual object may be applied, but is not limited, to a game application, such as a racing game application. When a client of the game application is controlling a virtual object to perform an action combination of the first target action and the second target action, adjustment on the movement of the virtual object is triggered, such that efficiency of the virtual object obtaining a game item or a game skill is further adjusted. When increasing power collected per unit time in the power meter corresponding to the

game item or the game skill, it may take less time for the accumulating collected power in the power meter to reach the trigger threshold. The virtual object may be, but is not limited to, an object such as a virtual role, virtual equipment, or a virtual vehicle controlled by a player in the racing game application. The first target action and the second target action may include, but are not limited to, a drifting action performed by the virtual object when passing a turn arranged in a game task. The first target action and the second target action may be, but are not limited to, drifting actions toward a same direction. The foregoing description is merely an example, and this embodiment is not limited thereto.

[0111] In embodiments of the present disclosure, when the virtual object is performing the acceleration operation, the movement of the virtual object is controlled to be adjusted from the first state to the second state within the second target time period after the second target action starts, in a case that the second operation instruction configured to instruct performing the second target action is obtained within the first target time period after the first target action is completed, where the duration of executing the first target action is less than the first threshold. Thereby, the virtual object starts to collect power based on the second power corresponding to the second state. The power collected by the virtual object per unit time is triggered to be increased from the first power to the second power, by using the foregoing control logic, which improves efficiency of power collection. Hence, a waiting time for re-activating the acceleration-control key is shortened, and it is unnecessary to repeat a target action for excessive times to collect power. Control operations on the virtual object are simplified and less complicated. Addressed is the technical issue of complex operations when controlling a virtual object in conventional technology.

[0112] In an optional solution, the first control unit 1206 includes a first obtaining module and an adjustment module.

[0113] 1) The first obtaining module is configured to obtain a first value of a parameter, where the first value corresponds to a force applied on the virtual object in the first state.

[0114] 2) The adjustment module is configured to adjust the first value of the parameter to a second value of the parameter, where the second value corresponds to the second state.

[0115] In an optional embodiment, the adjustment module includes a first adjustment sub-module and a second adjustment sub-module.

[0116] (1) The first adjustment sub-module is configured to increase, based on a first target ratio, a first force-parameter value of the virtual object to a second force-parameter value, in a case that the applied force includes a turning force, the first value of the parameter includes the first

force-parameter value, and the second value of the parameter includes the second force-parameter value. A direction of the turning force is perpendicular to a forward direction of the virtual object.

[0117] (2) The second adjustment sub-module is configured to decrease, based on a second target ratio, a first friction-parameter value of the virtual object is decreased to a second friction-parameter value, in a case that the applied force includes friction, the first value of the parameter includes a first friction-parameter value, and the second value of the parameter includes a second friction-parameter value.

[0118] According to embodiments of the present disclosure, parameters of the turning force and the friction are adjusted based on the target ratios, so as to adjust the virtual object from the first state to the second state. Hence, state adjustment on the virtual object can be triggered through the foregoing process of performing the actions. The power collected per unit time is automatically adjusted, and control operations on the virtual object are simplified.

[0119] In an optional solution, the first control unit further includes a determining module and a second obtaining module.

[0120] 1) The determining module is configured to determine a lateral speed vector of the virtual object based on the second value of the parameter. A direction of the lateral speed vector is perpendicular to a forward direction of the virtual object.

[0121] 2) The second obtaining module is configured to obtain the second power corresponding to the lateral speed vector.

[0122] In an optional embodiment, the second obtaining module includes an obtaining sub-module and a determining sub-module.

[0123] (1) The obtaining sub-module is configured to obtain a square of a speed represented by the lateral speed vector.

[0124] (2) The determining sub-module is configured to determine the second power based on a value of the square. The second power is proportional to the value of the square.

[0125] According to embodiments of the present disclosure, adjustment on the lateral speed of the virtual object is controlled through adjustment on the parameter of the force(s) applied on the virtual object. Thereby, power (the amount of nitro) collected per unit time, which is associated with the lateral speed, is also increased. It takes less time to fill the power meter with the power.

[0126] In an optional solution, the apparatus further includes a third obtaining unit and a display unit.

[0127] 1) The third obtaining unit is configured to obtain a state of the virtual object performing the acceleration operation, in a case that duration of performing the second target action reaches a second threshold and a speed represented by the movement speed vector of the virtual object reaches a target threshold, after the movement of the virtual object from the first state to the second state.

[0128] 2) The display unit is configured to display prompt information in the client, in a case that the state indicates that the virtual object is in an accelerating state. The prompt information is configured to show that the virtual object has completed an action combination including the first target action and the second target action.

[0129] The duration of performing the second target action may reach the second threshold, the movement speed vector of the virtual object may reach the target threshold, and the virtual object may be still in the accelerating state. At such time in this embodiment, the player may be prompted in the client that the action combination has been completed. For example, a "cadence & trailing" identifier is displayed, which indicates that the drifting actions, i.e. the "cadence drift" and the "trailing drift", have been completed.

[0130] According to embodiments of the present disclosure, the prompt information indicating that the action combination has completed is displayed, so as to show the user intuitively a result generated from the process of controlling the virtual object. Thereby, user experience is improved.

[0131] An electronic device is further provided according to another aspect of embodiments of the present disclosure, for implementing the forgoing method. As shown in Figure 13, the electronic device includes a memory 1302 and a processor 1304. The memory 1302 stores a computer program, and the processor 1304 is configured to perform the steps in any forgoing method embodiment through the computer program.

[0132] In an optional embodiment, the electronic device may be located in at least one of multiple network devices in a computer network, such as the aforementioned user equipment or the aforementioned server.

[0133] In an optional embodiment, the processor may be configured to perform following steps S1 to S4 through the computer program.

[0134] In step S1, a first operation instruction is obtained when a virtual object controlled by a client is performing an acceleration operation. The first operation instruction is configured to instruct controlling the virtual object to perform a first target action.

[0135] In step S2, a second operation instruction is obtained within a first target time period after the first target action is completed. The second operation instruction is configured to instruct controlling the virtual object to perform a second target action.

[0136] In step S3, movement of the virtual object is adjusted from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action. A first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state.

[0137] In step S4, a state of an acceleration-control key corresponding to the acceleration operation is adjusted to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0138] Those skilled in the art can understand that the structure as shown in Figure 11 is only illustrative. The electronic device may be alternatively a terminal device such as a smartphone (for example, an Android mobile phone or an iOS mobile phone), a tablet computer, a palmtop computer, a mobile Internet device (MID), or a PAD. Figure 13 does not limit the structure of the electronic device. For example, the electronic device may further include more or fewer components (such as a network interface) than those as shown in Figure 13, or have a configuration different from that as shown in Figure 13.

[0139] The memory 1302 may be configured to store a software program and a module, for example, a program instruction/module corresponding to the method and apparatus for executing the action according to embodiments of the present disclosure. The processor 1304 performs various functional applications and data processing, that is, implements the foregoing action execution method, by running a software program and a module stored in the memory 1302. The memory 1302 may include a high-speed random memory, and may include a non-volatile memory, for example, one or more magnetic storage apparatuses, a flash memory, or another nonvolatile solid-state memory. In some embodiments, the memory 1302 may further include memories disposed remotely relative to the processor 1304, and the remote memories may be connected to a terminal via a network. Examples of the network include, but are not limited to, the Internet, an intranet, a local area network, a mobile communication network, or a combination thereof. In a specific embodiment, the memory 1302 may be configured, but is not limited, to store information such as related control information or operation instructions for the target object. In an example as shown in Figure 13, the memory 1302 may include, but is not limited to, the first obtaining unit 1202, the second obtaining unit 1204, the first control unit 1206, and the second control unit 1208 in the foregoing apparatus for controlling the virtual object. In addition, the memory may further

include, but is not limited to, other modules and units in the foregoing apparatus for controlling the virtual object. Details are not described again herein.

[0140] In an optional embodiment, a transmission apparatus 1306 is configured to receive or transmit data via a network. Specific examples of the network may include a wired network and a wireless network. As an example, the transmission device 1306 includes a network interface controller (NIC). The NIC may be connected to another network device and a router via a network cable, to communicate with the Internet or a local area network. As an example, the transmission device 1306 is a radio frequency (RF) module which communicates with the Internet wirelessly.

[0141] In addition, the electronic device further includes a display 1308 and a connection bus 1310. The display 1308 is configured to display the first target action, the second target action, and corresponding keys. The connection bus 1310 is configured to connect various modular components in the foregoing electronic device.

[0142] A storage medium is further provided according to another aspect of embodiments of the present disclosure. The storage medium stores a computer program. The computer program when executed is configured to perform steps in any foregoing method embodiment.

[0143] In an optional embodiment, the storage medium may be configured to store the computer program for executing following steps.

[0144] In step S1, a first operation instruction is obtained when a virtual object controlled by a client is performing an acceleration operation. The first operation instruction is configured to instruct controlling the virtual object to perform a first target action.

[0145] In step S2, a second operation instruction is obtained within a first target time period after the first target action is completed. The second operation instruction is configured to instruct controlling the virtual object to perform a second target action.

[0146] In step S3, movement of the virtual object is adjusted from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action. A first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state.

[0147] In step S4, a state of an acceleration-control key corresponding to the acceleration operation is adjusted to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

[0148] A computer program product including instructions is further provided according to embodiments of the present disclosure. The computer program product, when executed on a computer, configures the computer to perform the steps in any foregoing method embodiment.

[0149] Those skilled in the art can understand that all or some of the steps of the methods in the foregoing embodiments may be implemented by a program instructing relevant hardware of a terminal device. The program may be stored in a computer-readable storage medium. The storage medium may include a flash disk, a read-only memory (ROM), a random access memory (RAM), a magnetic disk, an optical disc, or the like.

[0150] Sequence numbers in the foregoing embodiments of the present disclosure are merely for description purpose but do not imply preferences among the embodiments.

[0151] When the integrated unit in the foregoing embodiments is implemented in a form of a software functional unit and sold or used as an independent product, the integrated unit may be stored in the foregoing computer-readable storage medium. Based on such an understanding, an essence, a part contributing to the related art, or all or a part of the technical solutions of the present disclosure may be implemented in a form of a software product. The computer software product is stored in a storage medium and includes several instructions for instructing one or more computer devices (which may be a PC, a server, a network device, or the like) to perform all or some of steps of the methods in embodiments of the present disclosure.

[0152] In the foregoing embodiments of the present disclosure, the descriptions of the embodiments focus on different aspects. A part that is not described in detail in an embodiment may refer to related description in other embodiments.

[0153] In the several embodiments of the present disclosure, it should be understood that the disclosed client may be implemented in another manner. The apparatus embodiments described above are merely exemplary. For example, a division of the units is merely a division of logic functions, and other division manners may be adopted during actual implementations. For example, multiple units or components may be combined, or may be integrated into another system. Some features may be omitted or not performed. In addition, the coupling, or direct coupling, or communication connection among the displayed or discussed components may be indirect coupling or communication connection via some interfaces, units, or modules, and may be electrical or in other forms.

[0154] The units described as separate components may or may not be physically separated, and the components displayed as units may or may not be physical units. They may be located in

one place or may be distributed among multiple network units. Some or all of the units may be selected according to actual needs to achieve the objectives of the solutions of the embodiments.

[0155] In addition, functional units in the embodiments of the present disclosure may be integrated into one processing unit, or each of the units may be physically separated, or two or more units may be integrated into one unit. The integrated unit may be implemented in a form of hardware, or may be implemented in a form of a software functional unit.

[0156] The foregoing descriptions are merely exemplary implementations of the present disclosure. Those in the art may further make several improvements and modifications without departing from the principle of the present disclosure, and the improvements and modifications fall within the protection scope of the present disclosure.

CLAIMS

What is claimed is:

1. A method for controlling a virtual object, performed by an electronic device, wherein the method comprises:

obtaining a first operation instruction when a virtual object controlled by a client is performing an acceleration operation, wherein the first operation instruction is configured to instruct controlling the virtual object to perform a first target action;

obtaining a second operation instruction within a first target time period after the first target action is completed, wherein the second operation instruction is configured to instruct controlling the virtual object to perform a second target action;

adjusting movement of the virtual object from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action, wherein a first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state; and

adjusting an acceleration-control key corresponding to the acceleration operation to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

2. The method according to claim 1, wherein adjusting the movement of the virtual object from the first state to the second state within the second target time period after the virtual object starts to perform the second target action comprises:

obtaining a first value of a parameter, wherein the first value corresponds to a force applied on the virtual object in the first state; and

adjusting the first value of the parameter to a second value of the parameter, wherein the second value corresponds to the second state.

3. The method according to claim 2, wherein adjusting the first value of the parameter to the second value corresponding to the second state comprises:

increasing, based on a first target ratio, a first force-parameter value of the virtual object to a second force-parameter value, in a case that the applied force comprises a turning force, wherein the first value of the parameter comprises the first force-parameter value, the second value of the parameter comprises the second force-parameter value, and a direction of the turning force is perpendicular to a forward direction of the virtual object; and

decreasing, based on a second target ratio, a first friction-parameter value of the virtual object to a second friction-parameter value, in a case that the applied force comprises friction, wherein the first value of the parameter comprises the first friction-parameter value, and the second value of the parameter comprises the second friction-parameter value.

4. The method according to claim 2, wherein after adjusting the first value of the parameter to the second value corresponding to the second state, the method further comprises:

determining a lateral speed vector of the virtual object based on the second value of the parameter, wherein a direction of the lateral speed vector is perpendicular to a forward direction of the virtual object; and

obtaining the second power corresponding to the lateral speed vector.

5. The method according to claim 4, wherein obtaining the second power corresponding to the lateral speed vector comprises:

obtaining a square of a speed represented by the lateral speed vector; and

determining the second power based on a value of the square, wherein the second power is proportional to the value of the square.

6. The method according to any one of claims 1 to 5, wherein after adjusting the movement of the virtual object from the first state to the second state, the method further comprises:

obtaining a state of the virtual object performing the acceleration operation, in a case that duration of performing the second target action reaches a second threshold and a speed represented by the movement speed vector of the virtual object reaches a target threshold; and

displaying prompt information in the client, in a case that the state indicates that the virtual object is in an accelerating state, wherein the prompt information is configured to show that the virtual object has completed an action combination including the first target action and the second target action.

7. The method according to any one of claims 1 to 5, wherein the first target action and the second target action are drifting actions toward to a same direction.

8. An apparatus for controlling a virtual object, comprising:

a first obtaining unit, configured to obtain a first operation instruction when a virtual object controlled by a client is performing an acceleration operation, wherein the first operation instruction is configured to instruct controlling the virtual object to perform a first target action;

a second obtaining unit, configured to obtain a second operation instruction within a first target time period after the first target action is completed, wherein the second operation instruction is configured to instruct controlling the virtual object to perform a second target action;

a first control unit, configured to adjust movement of the virtual object from a first state to a second state, within a second target time period after the virtual object starts to perform the second target action, wherein a first power collected by the virtual object per unit time in the first state is less than a second power collected by the virtual object per unit time in the second state; and

a second control unit, configured to adjust an acceleration-control key corresponding to the acceleration operation to be in a state allowing touch control, in a case that the accumulating collected power reaches a trigger threshold.

9. The apparatus according to claim 8, wherein the first control unit comprises:

a first obtaining module, configured to obtain a first value of a parameter, wherein the first value corresponds to a force applied on the virtual object in the first state; and

an adjustment module, configured to adjust the first value of the parameter to a second value of the parameter, wherein the second value corresponds to the second state.

10. The apparatus according to claim 9, wherein the adjustment module comprises:

a first adjustment sub-module, configured to increase, based on a first target ratio, a first force-parameter value of the virtual object to a second force-parameter value, in a case that the applied force comprises a turning force, wherein the first value of the parameter comprises the first force-parameter value, the second value of the parameter comprises the second force-parameter value, and a direction of the turning force is perpendicular to a forward direction of the virtual object; and

a second adjustment sub-module, configured to decrease, based on a second target ratio, a first friction-parameter value of the virtual object to a second friction-parameter value, in a case that the applied force comprises friction, wherein the first value of the parameter comprises the first friction-parameter value, and the second value of the parameter comprises the second friction-parameter value.

11. The apparatus according to claim 10, wherein the first control unit further comprises:

a determining module, configured to determine a lateral speed vector of the virtual object based on the second value of the parameter, wherein a direction of the lateral speed vector is perpendicular to a forward direction of the virtual object; and

a second obtaining module, configured to obtain the second power corresponding to the lateral speed vector.

12. The apparatus according to claim 11, wherein the second obtaining module comprises:

an obtaining sub-module, configured to obtain a square of a speed represented by the lateral speed vector; and

a determining sub-module, configured to determine the second power based on a value of the square, wherein the second power is proportional to the value of the square.

13. The apparatus according to any one of claims 8 to 12, further comprising:

a third obtaining unit, configured to obtain a state of the virtual object performing the acceleration operation, in a case that duration of performing the second target action reaches a second threshold and a speed represented by the movement speed vector of the virtual object reaches a target threshold; and

a display unit, configured to display prompt information in the client, in a case that the state indicates that the virtual object is in an accelerating state, wherein the prompt information is configured to show that the virtual object has completed an action combination including the first target action and the second target action.

14. The apparatus according to any one of claims 8 to 12, wherein the first target action and the second target action are drifting actions toward to a same direction.

15. A storage medium, comprising a stored computer program, wherein:

the computer program when executed performs the method according to any one of claims 1 to 7.

16. An electronic device, comprising a memory and a processor, wherein:

the memory stores a computer program; and

the processor is configured to perform the method according to any one of claims 1 to 7 through the computer program.

17. A computer program product, comprising instructions, wherein:

the instructions, when executed on a computer, configure the computer to perform the method according to any one of claims 1 to 7.