

VIRTUAL OBJECT CONTROL METHOD AND APPARATUS, TERMINAL, AND STORAGE MEDIUM

RELATED APPLICATION

[0001] This application claims priority to Chinese Patent Application No. 201910707805.2, filed on August 1, 2019 and entitled "VIRTUAL OBJECT CONTROL METHOD AND APPARATUS, TERMINAL, AND STORAGE MEDIUM", which is incorporated herein by reference in its entirety.

FIELD OF THE TECHNOLOGY

[0002] Embodiments of this application relate to the field of computer and Internet technologies, and in particular, to a virtual object control method and apparatus, a terminal, and a storage medium.

BACKGROUND OF THE DISCLOSURE

[0003] At present, in some shooter games (STGs) on a mobile terminal, a player may control a virtual firearm held by a virtual object to shoot in a game scene provided in a game battle, to kill an enemy virtual object to win the game battle.

[0004] An operation manner of controlling a virtual object to shoot provided in the related art is relatively complex and inefficient.

SUMMARY

[0005] Embodiments of this application provide a virtual object control method and apparatus, a terminal, and a storage medium. The technical solutions are as follows:

[0006] According to an aspect, an embodiment of this application provides a virtual object control method, applicable to a mobile terminal, the method including:

[0007] displaying a user interface (UI), the UI including a first fire button, the first fire button being an operation control configured to trigger to aim down sights (ADS) and fire;

[0008] controlling, when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object to enter an ADS state, the ADS state being a state of observing a virtual environment by using a virtual scope for the virtual firearm;

[0009] determining whether a fire condition is satisfied; and

[0010] controlling, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot.

[0011] According to another aspect, an embodiment of this application provides a virtual object control apparatus, including:

[0012] an interface display module, configured to display a UI, the UI including a first fire button, the first fire button being an operation control configured to trigger to ADS and fire;

[0013] an ADS control module, configured to control, when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object to enter an ADS state, the ADS state being a state of observing a virtual environment by using a virtual scope for the virtual firearm;

[0014] a condition detection module, configured to determine whether a fire condition is satisfied; and

[0015] a shooting control module, configured to control, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot.

[0016] According to still another aspect, an embodiment of this application provides a mobile terminal, including a processor and a memory, the memory storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by the processor to implement the virtual object control method.

[0017] According to yet another aspect, an embodiment of this application provides a computer-readable storage medium, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by a processor to implement the virtual object control method.

[0018] According to a further aspect, an embodiment of this application provides a computer program product, the computer program product, when run on a mobile terminal, causing the mobile terminal to perform the virtual object control method.

[0019] In the technical solutions provided in the embodiments of this application, a first fire button configured to trigger to ADS and fire is designed in a UI, and when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object is controlled to enter an ADS state, and the virtual firearm is controlled to shoot at the same time when the virtual firearm is in an ADS state, thereby implementing a one-tap ADS and fire

capability, i.e., ADS and fire can be implemented by performing one operation, not two operations, thereby fully improving operation efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] To describe the technical solutions in the embodiments of this application more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show only some embodiments of this application, and a person of ordinary skill in the art may still derive other accompanying drawings from these accompanying drawings without creative efforts.

[0021] FIG. 1 is a schematic diagram of an implementation environment according to an embodiment of this application.

[0022] FIG. 2 is a schematic structural diagram of a mobile terminal according to an embodiment of this application.

[0023] FIG. 3 is a flowchart of a virtual object control method according to an embodiment of this application.

[0024] FIG. 4 is an exemplary schematic diagram of a first fire button.

[0025] FIG. 5 is an exemplary schematic diagram of a setting interface.

[0026] FIG. 6 is a flowchart of a virtual object control method according to another embodiment of this application.

[0027] FIG. 7 is an exemplary schematic diagram of a second fire button.

[0028] FIG. 8 is a flowchart of a virtual object control method according to another embodiment of this application.

[0029] FIG. 9 is a block diagram of a virtual object control apparatus according to an embodiment of this application.

[0030] FIG. 10 is a block diagram of a virtual object control apparatus according to another embodiment of this application.

[0031] FIG. 11 is a structural block diagram of a mobile terminal according to an embodiment of this application.

DESCRIPTION OF EMBODIMENTS

[0032] To make objectives, technical solutions, and advantages of this application clearer, the following further describes in detail implementations of this application with reference to the accompanying drawings.

[0033] Before embodiments of this application are described, related terms involved in this application are explained first.

[0034] 1. Virtual object

[0035] A virtual object is a virtual character controlled by a user account in an application. For example, the application is a game application. The virtual object is a game character controlled by the user account in the game application. The virtual object may be in a human form, an animal form, a cartoon form, or another form. This is not limited in the embodiments of this application. The virtual object may be presented in a three-dimensional form or a two-dimensional form, which is not limited in the embodiments of this application.

[0036] In different game applications, operations that can be performed by the virtual object controlled by the user account may be different. For example, in an STG application, the user account may control the virtual object to perform operations such as shooting, running, jumping, firearm picking up, firearm replacing, and bullet loading.

[0037] Certainly, in addition to the game applications, in applications of other types, for example, an augmented reality (AR) application, a social application, or an interactive entertainment application, a virtual object may also be presented to a user and provided with a corresponding function, which is not limited in the embodiments of this application. Besides, virtual objects provided in different applications have different forms and corresponding functions, which may be preset according to an actual requirement, which is not limited in the embodiments of this application.

[0038] 2. Virtual firearm

[0039] A virtual firearm is a virtual item that can simulate a real firearm to shoot. A virtual firearm may be a three-dimensional model of a real firearm, and a virtual object can carry a virtual firearm and control the virtual firearm to shoot at a target.

[0040] A virtual firearm may include a plurality of different firearm categories such as a rifle, a submachine gun, a machine gun, a shotgun, and a pistol. Firearm categories may be established with reference to actual requirements. For example, rifles may be further divided into

different categories such as an assault rifle and a sniper rifle, and machine guns may be further divided into different categories such as a light machine gun and a heavy machine gun.

[0041] 3. Virtual scope

[0042] A virtual scope is a virtual item equipped on a virtual firearm and configured to assist observation of a virtual environment. A virtual scope may be a three-dimensional model of a real scope. After being equipped with a virtual scope, a virtual firearm may enter an ADS state. The ADS state is a state of observing a virtual environment by using the virtual scope.

[0043] A virtual scope may include sights of different magnifications (such as a 2X sight, a 3X sight, a 4X sight, a 6X sight, and an 8X sight), a laser sight, a red dot sight, a holographic sight, and the like.

[0044] FIG. 1 is a schematic diagram of an implementation environment according to an embodiment of this application. The implementation environment may include a mobile terminal 10 and a server 20.

[0045] The mobile terminal 10 may be a portable electronic device such as a mobile phone, a tablet computer, a game console, an ebook reader, a multimedia playback device, and a wearable device. A client of a game application such as a client of an STG application may be installed on the mobile terminal 10.

[0046] The server 20 is configured to provide a backend service to the client of the application (for example, a game application) on the mobile terminal 10. For example, the server 20 may be a backend server of the application (for example, the game application). The server 20 may be one server, a server cluster including a plurality of servers, or a cloud computing service center.

[0047] The mobile terminal 10 and the server 20 may communicate with each other through a network 30. The network 30 may be a wired network or a wireless network.

[0048] Steps in method embodiments of this application may be performed by the mobile terminal. FIG. 2 is a schematic structural diagram of a mobile terminal according to an embodiment of this application. The mobile terminal 10 may include a mainboard 110, an external output/input device 120, a memory 130, an external interface 140, a touch system 150, and a power supply 160.

[0049] Processing elements such as a processor and a controller are integrated in the mainboard 110.

[0050] The external output/input device 120 may include a display component (for example, a display screen), a sound playback component (for example, a speaker), a sound collecting component (for example, a microphone), and various buttons.

[0051] The memory 130 stores program code and data.

[0052] The external interface 140 may include an earphone interface, a charging interface, a data interface, and the like.

[0053] The touch system 150 may be integrated in the display component or the buttons of the external output/input device 120, and the touch system 150 is configured to detect touch operations performed by a user on the display component or the buttons.

[0054] The power supply 160 is configured to supply power to other components in the mobile terminal 10.

[0055] In this embodiment of this application, the processor in the mainboard 110 may generate a UI (for example, a game interface) by executing or calling the program code and the data stored in the memory, and present the generated UI (for example, the game interface) by using the external output/input device 120. During presentation of the UI (for example, the game interface), a touch operation performed during interaction between the user and the UI (for example, the game interface) may be detected through the touch system 150, and a response is made to the touch operation.

[0056] In the related art, a UI of an STG is provided with an ADS button and a fire button. After tapping an ADS button, a user may control a virtual firearm held by a virtual object to enter an ADS state. In the ADS state, a player can observe a virtual environment by using a virtual scope for the virtual firearm. After tapping a fire button, a user may control a virtual firearm held by a virtual object to shoot.

[0057] In an actual application, a player has a requirement of shooting in an ADS state, so as to aim and shoot a target more accurately. However, in the related art, it is necessary to first tap an ADS button and then tap a fire button before shooting can be implemented in an ADS state.

[0058] In the technical solutions provided in the embodiments of this application, a first fire button configured to trigger to ADS and fire is designed in a UI, and when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object is controlled to enter an ADS state, and the virtual firearm is controlled to shoot at the same time when the virtual firearm is in an ADS state, thereby implementing a one-tap ADS and fire

capability, i.e., ADS and fire can be implemented by performing one operation, not two operations, thereby fully improving operation efficiency.

[0059] FIG. 3 is a flowchart of a virtual object control method according to an embodiment of this application. The method is applicable to the mobile terminal described above such as a client of an application (for example, an STG application) on the mobile terminal. The method may include the following steps:

[0060] Step 301: Display a UI, the UI including a first fire button, the first fire button being an operation control configured to trigger to ADS and fire.

[0061] An STG application is used as an example. The UI may be a display interface of a game battle. The UI is configured to present a virtual environment of the game battle to a user. For example, the UI may include an element such as a virtual building, a virtual item, and a virtual object in the virtual environment. Optionally, the UI further includes some operation controls such as buttons, sliders, and icons for the user to operate.

[0062] In this embodiment of this application, as shown in FIG. 4, a UI 40 includes a first fire button 41, and the first fire button 41 is an operation control configured to trigger to ADS and fire. That is, an ADS function and a fire function are integrated into the same button instead of being implemented by using two different buttons respectively, so as to implement a one-tap ADS and fire capability.

[0063] Step 302: Control, when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object to enter an ADS state.

[0064] The ADS state is a state of observing a virtual environment by using a virtual scope for the virtual firearm. For example, in an ADS state, a virtual scope for a virtual firearm and a virtual environment seen through the virtual scope may be displayed in a UI.

[0065] In an exemplary embodiment, the mobile terminal determines whether the trigger signal corresponding to the first fire button is received in the following manners: obtaining, when a touch operation signal is received, a touch position of the touch operation signal; obtaining a distance between the touch position and a center position of the first fire button; and determining, when the distance is less than a first threshold, that the trigger signal corresponding to the first fire button is received.

[0066] When the first fire button is circular, the first threshold may have the same radius as that of the first fire button, or may have a radius different from that of the first fire button. For

example, the radius of the first threshold is slightly greater than or less than the radius of the first fire button.

[0067] When it is detected that the distance between the touch position of the touch operation signal and the center position of the first fire button is less than the first threshold, it is considered that the user taps the first fire button with a finger, and it is also determined that the trigger signal corresponding to the first fire button is received.

[0068] For example, the coordinates of the center position of the first fire button and the first threshold are configured in a configuration file, so that after a touch operation signal is received, a touch position of the touch operation signal is obtained, then the touch position is compared with the center position of the first fire button configured in the configuration file to calculate a distance between the touch position and the center position, and then the distance is compared with the first threshold to determine whether the trigger signal corresponding to the first fire button is received. The configuration file may be a configuration file in a JavaScript Object Notation (JSON) format. The coordinates of the center position of the first fire button and the first threshold are configured in the configuration file, so that a skilled person can modify the first fire button by replacing the configuration file without modifying the overall application code, making project version iteration much more convenient.

[0069] In addition, the mobile terminal may further detect whether the virtual firearm held by the virtual object supports ADS fire; and perform, when the virtual firearm supports the ADS fire and when the trigger signal corresponding to the first fire button is received, the operation of controlling a virtual firearm held by a virtual object to enter an ADS state, or control, when the virtual firearm does not support the ADS fire and the trigger signal corresponding to the first fire button is received, the virtual firearm to hip fire. The hip fire is a fire manner of directly performing a shooting operation without performing an ADS operation.

[0070] Optionally, the mobile terminal detects whether the virtual firearm held by the virtual object supports the ADS fire by using the following steps:

[0071] 1: obtaining a firearm category to which the virtual firearm belongs;

[0072] 2: obtaining a setting option corresponding to the firearm category, the setting option being configured to set a fire manner, the fire manner including the ADS fire and hip fire; and

[0073] 3: determining, when the setting option corresponding to the firearm category is the ADS fire, that the virtual firearm supports the ADS fire.

[0074] In this embodiment of this application, a virtual firearm may include a plurality of different firearm categories such as a rifle, a submachine gun, a machine gun, a shotgun, and a pistol. A user may set a corresponding fire manner for each firearm category according to an actual requirement. For example, for a rifle, a fire manner correspondingly set by the user is the ADS fire; and for a submachine gun, a fire manner correspondingly set by the user is the hip fire.

[0075] For example, as shown in FIG. 5, a plurality of different firearm categories, for example, including an assault rifle, a submachine gun, a shotgun, and a sniper rifle, are provided in a fire manner setting region 51 of a setting interface 50. For each firearm category, two setting options, that is, the ADS fire and the hip fire, are provided correspondingly. A user may set a fire manner corresponding to each firearm category flexibly according to an actual requirement. For example, as shown in FIG. 5, a fire manner corresponding to the assault rifle is set to the ADS fire, a fire manner corresponding to the submachine gun is set to the ADS fire, and a fire manner corresponding to the shotgun is set to the hip fire.

[0076] Certainly, the user may alternatively set fire manners of all the firearm categories with one key, for example, set the fire manners of all the firearm categories to the ADS fire, or set the fire manners of all the firearm categories to the hip fire.

[0077] Step 303: Detect whether a fire condition is satisfied.

[0078] After receiving the trigger signal corresponding to the first fire button, the mobile terminal further needs to detect whether a current state satisfies a fire condition. The fire condition is a preset condition that allows a virtual firearm held by a virtual object to fire and shoot.

[0079] Optionally, the fire condition may include a first fire condition set for the virtual object and a second fire condition set for the virtual firearm. The mobile terminal may detect whether the virtual object satisfies the first fire condition; and detect, when the virtual object satisfies the first fire condition, whether the virtual firearm satisfies the second fire condition; and determine, when the virtual firearm satisfies the second fire condition, that the fire condition is satisfied. In addition, if the virtual object does not satisfy the first fire condition or the virtual firearm does not satisfy the second fire condition, the mobile terminal determines that the fire condition is not satisfied. Certainly, the foregoing two steps of detecting whether the virtual object satisfies the first fire condition and whether the virtual firearm satisfies the second fire condition may be performed successively or simultaneously. This is not limited in this embodiment of this application.

[0080] Optionally, the detecting whether the virtual object satisfies the first fire condition includes: obtaining state information of the virtual object; and detecting, according to the state information of the virtual object, whether the virtual object satisfies the first fire condition, the first fire condition including, but not limited to, at least one of the following: when the virtual object is alive, when the virtual object is not driving a vehicle, or when the virtual object is not in water. If the virtual object does not satisfy the first fire condition, for example, if the virtual object is dead or the virtual object is driving a vehicle, the virtual object cannot control the virtual firearm to fire. The first fire condition may be preset, and this is not limited in this embodiment of this application.

[0081] Optionally, the detecting whether the virtual firearm satisfies a second fire condition includes: obtaining state information of the virtual firearm; and detecting, according to the state information of the virtual firearm, whether the virtual firearm satisfies the second fire condition, the second fire condition including, but not limited to, at least one of the following: when the virtual firearm has bullets left, or when the virtual firearm is not reloading bullets. If the virtual firearm does not satisfy the second fire condition, for example, if the virtual firearm has no bullets left or the virtual firearm is reloading bullets, the virtual object cannot control the virtual firearm to fire. The second fire condition may be preset, and this is not limited in this embodiment of this application.

[0082] Step 304: Control, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot.

[0083] If a current state satisfies the fire condition and the virtual firearm is in the ADS state, the virtual firearm is controlled to shoot. In the foregoing manners, the user may trigger two operations of ADS and fire by tapping one button (that is, the first fire button described above) with one finger, thereby implementing a "one-tap ADS fire" function. In addition, if the current state does not satisfy the fire condition, the procedure may be ended, and the mobile terminal does not control the virtual firearm to perform a shooting operation.

[0084] An ADS button and a fire button are set in the related art, and some users may implement quick ADS and fire by using a multi-finger operating. For example, a user taps the ADS button with one finger and taps the fire button with another finger. However, the ADS button and the fire button are usually set on the same side of the UI, for example, are both set on a right side of the UI, and a joystick operation control for controlling a virtual object to move is set on a left side of the UI. Therefore, the user needs to tap the ADS button and the fire button with two fingers of one hand respectively, which is relatively difficult for the user to operate. Although the ADS button and the fire button are set on two sides of the interface, the user also needs to perform a multi-finger

operation. For example, the user controls movement with one finger of the left hand, taps the ADS button with one finger of the right hand, and taps the fire button with another finger of the left hand. According to the technical solutions provided in this embodiment of this application, the user may implement two operations of ADS and fire by tapping one key with one finger, which fully reduces the operation difficulty for the user and improves the operation efficiency. In addition, advantages that a multi-finger player (for example, a three-finger player or a four-finger player) has over a two-finger player are eliminated to some extent, allowing the two-finger player to have adequate game experience.

[0085] In addition, if the virtual firearm supports continuous fire, in a duration of the trigger signal, the virtual firearm is controlled to perform a shooting operation every preset time interval. The preset time interval may be preset. For example, preset time intervals (that is, fire intervals) corresponding to different virtual firearms may be the same or different. If the virtual firearm does not support the continuous fire, the virtual firearm is controlled to perform one shooting operation in a duration of the trigger signal.

[0086] In an exemplary embodiment, when the virtual firearm is in an ADS state, the user may further adjust a touch position corresponding to a trigger signal by moving a finger. Correspondingly, the mobile terminal obtains a touch position corresponding to the trigger signal in a duration of the trigger signal, and adjusts a shooting direction of the virtual firearm according to the touch position corresponding to the trigger signal. Optionally, the mobile terminal determines a relative position relationship between the touch position corresponding to the trigger signal and a center point of the first fire button, and determines a shooting direction of the virtual firearm based on the relative position relationship. For example, four directions of up, down, left, and right in the relative position relationship respectively correspond to four directions of North, South, West, and East in a virtual environment in which the virtual object is located. In this case, it is assumed that the touch position corresponding to the trigger signal is located at 45° of an upper right part of the center point of the first fire button, and the shooting direction of the virtual firearm is determined as 45° North by East. It is assumed that the touch position corresponding to the trigger signal is located at 30° of a lower left part of the center point of the first fire button, and the shooting direction of the virtual firearm is determined as 30° South by West. After determining the shooting direction of the virtual firearm, the mobile terminal may first control the virtual object to face the shooting direction, display a virtual environment within a range of a front field of view of the virtual object in the UI, and then control the virtual firearm to shoot in the shooting direction. That is, in the foregoing manner, three operations of ADS, aim, and fire are completed with one key, which fully improves the operation efficiency.

[0087] when the solutions provided in the related art are adopted, if the user wants to quickly complete three operations of ADS, aim, and fire by using a multi-finger operation, the user needs to use one finger of the left hand to control the virtual object to move, tap the ADS button with one finger of the right hand, rotate a viewing angle with another finger of the right hand to aim at an enemy virtual object, and tap the fire button with another finger of the left hand, which imposes a very high requirement on the user operation.

[0088] According to the technical solutions provided in this embodiment of this application, a joystick function is configured for the first fire button. After tapping the first fire button, the user may adjust the shooting direction of the virtual firearm by moving a finger without lifting the finger from a screen. Therefore, the user may complete three operations of ADS, aim, and fire with one finger, which fully reduces the operation difficulty for the user.

[0089] In summary, in the technical solutions provided in the embodiments of this application, a first fire button configured to trigger to ADS and fire is designed in a UI, and when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object is controlled to enter an ADS state, and the virtual firearm is controlled to shoot at the same time when the virtual firearm is in an ADS state, thereby implementing a one-tap ADS and fire capability, i.e., ADS and fire can be implemented by performing one operation, not two operations, thereby fully improving operation efficiency.

[0090] In addition, in the duration of the trigger signal corresponding to the first fire button, the shooting direction of the virtual firearm can be adaptively adjusted according to a change of the touch position corresponding to the trigger signal, to implement three operations of ADS, aim, and fire with one key, thereby further improving the operation efficiency.

[0091] In another example, referring to FIG. 6, the virtual object control method provided in this embodiment of this application may include the following several steps:

[0092] Step 601: Determine whether the virtual firearm held by the virtual object supports ADS fire. Step 602 is performed if the virtual firearm supports ADS fire; and step 604 is performed if the virtual firearm does not support ADS fire.

[0093] Step 602: Determine whether a setting option of the virtual firearm is the ADS fire. Step 603 is performed if the setting option of the virtual firearm is the ADS fire; and step 604 is performed if the setting option of the virtual firearm is not the ADS fire.

[0094] Step 603: Determine the fire manner as the ADS fire.

[0095] Step 604: Determine the fire manner as the hip fire.

[0096] Step 605: Determine whether the trigger signal corresponding to the first fire button is received. Step 606 is performed if the trigger signal is received, and if the trigger signal is not received, step 605 is performed.

[0097] Step 606: Control the virtual firearm to enter an ADS state.

[0098] Step 607: Determine whether the virtual object satisfies a first fire condition. Step 608 is performed if the first fire condition is satisfied; and if the first fire condition is not satisfied, the procedure is ended.

[0099] Step 608: Determine whether the virtual firearm satisfies a second fire condition. Step 609 is performed if the second fire condition is satisfied; and step 607 is performed if the second fire condition is not satisfied.

[0100] Step 609: Control the virtual firearm to perform a shooting operation.

[0101] Step 610: Determine whether an interval duration from the previous shooting operation reaches a preset duration. Step 611 is performed if the interval duration reaches the preset duration. Step 610 continues to be performed if the interval duration does not reach the preset duration.

[0102] Step 611. Determine whether the trigger signal disappears. Step 612 is performed if the trigger signal does not disappear, and step 610 is performed again after step 612. Step 613 is performed if the trigger signal disappears.

[0103] Step 612: Control the virtual firearm to perform a shooting operation.

[0104] Step 613: Control the virtual firearm to stop performing the shooting operation.

[0105] In an exemplary embodiment, in addition to the first fire button, the UI further includes a second fire button. The second fire button is an operation control configured to trigger hip fire. The mobile terminal controls, when a trigger signal corresponding to the second fire button is received, the virtual firearm held by the virtual object to hip fire.

[0106] For example, as shown in FIG. 7, the UI 40 includes a first fire button 41 and a second fire button 42. The second fire button 42 may be set next to the first fire button 41, for example, set on a left side of the first fire button 41. In addition, a size of the second fire button 42 may be appropriately less than a size of the first fire button 41.

[0107] The mobile terminal may obtain, when a touch operation signal is received, a touch position of the touch operation signal; obtain a distance between the touch position of the touch operation signal and a center position of the second fire button; and determine, when the distance is

less than a second threshold, that the trigger signal corresponding to the second fire button is received. When the second fire button is circular, a radius of the second threshold may be the same as that of the second fire button or may be different from that of the second fire button. For example, the radius of the second threshold is slightly greater than or slightly less than the radius of the second fire button. When it is detected that the distance between the touch position of the touch operation signal and the center position of the second fire button is less than the second threshold, it is considered that the user taps the second fire button with a finger, that is, it is determined that the trigger signal corresponding to the second fire button is received. Similarly, coordinates of the center position of the second fire button and the second threshold may be configured in the configuration file. This is not limited in this embodiment of this application.

[0108] In this embodiment of this application, both the first fire button and the second fire button are provided in the UI, to provide more diversified fire manners for selection by the user. The user may implement ADS fire by tapping the first fire button, and the user may implement hip fire by tapping the second fire button, which better satisfies the operation requirements of the user.

[0109] The one-tap ADS fire provides convenience for quick ADS and fight. However, in a close battle, a virtual scope needs to be displayed in the UI, which blocks the user's sight and makes it difficult to aim and fire. Therefore, the second fire button is disposed next to the first fire button, so that the foregoing deficiency can be adequately remedied. For example, in a close battle, the user may tap the second fire button to directly hip fire, so as to avoid a problem caused by ADS. However, in a battle with a medium or long distance, the user may tap the first fire button to ADS fire, so as to provide more convenient and freer fire manners for selection by the user.

[0110] In addition, whether to display the first fire button only or display both the first fire button and the second fire button in the UI is set by the user according to an actual requirement. This is not limited in this embodiment of this application.

[0111] In an example, referring to FIG. 8, the virtual object control method provided in this embodiment of this application may include the following several steps:

[0112] Step 801: Determine whether it is configured that a current mode is to display dual fire buttons. Step 802 is performed if it is configured that a current mode is to display dual fire buttons; and the procedure is ended if a current mode is not configured to display dual fire buttons.

[0113] Step 802: Display a first fire button and a second fire button in a UI.

[0114] Step 803: Determine whether a trigger signal corresponding to one of the fire buttons is received. Step 804 is performed if the trigger signal is received; and step 803 is performed if the trigger signal is not received.

[0115] Step 804: Determine whether to tap the first fire button. Step 805 is performed if the first fire button is tapped, and step 807 is performed again after step 805. Step 806 is performed if the first fire button is not tapped.

[0116] Step 805: Trigger the first fire button.

[0117] Step 806: Trigger the second fire button.

[0118] Step 807: Control a virtual firearm held by a virtual object to enter an ADS state.

[0119] Step 808: Determine whether a fire condition is satisfied. Step 809 is performed if the fire condition is satisfied; and the procedure is ended if the fire condition is not satisfied.

[0120] Step 809: Control the virtual firearm to perform a shooting operation according to a selected fire manner.

[0121] Step 810: Control, when it is detected that the trigger signal disappears, the virtual firearm to stop performing the shooting operation.

[0122] The following is an apparatus embodiment of this application, which can be used to perform the method embodiments of this application. For details not disclosed in the apparatus embodiment of this application, reference may be made to the method embodiments of this application.

[0123] FIG. 9 is a block diagram of a virtual object control apparatus according to an embodiment of this application. The apparatus has functions of implementing the foregoing method embodiments. The functions may be implemented by hardware, or may be implemented by hardware executing corresponding software. The apparatus may be a mobile terminal or may be disposed in a mobile terminal. The apparatus 900 may include an interface display module 901, an ADS control module 902, a condition detection module 903, and a shooting control module 904.

[0124] The interface display module 901 is configured to display a UI, the UI including a first fire button, the first fire button being an operation control configured to trigger to ADS and fire.

[0125] The ADS control module 902 is configured to control, when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object to enter an

ADS state, the ADS state being a state of observing a virtual environment by using a virtual scope for the virtual firearm;

[0126] The condition detection module 903 is configured to determine whether a fire condition is satisfied.

[0127] the shooting control module 904 is configured to control, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot.

[0128] In an exemplary embodiment, the condition detection module 903 is configured to: determine whether the virtual object satisfies a first fire condition; detect, when the virtual object satisfies the first fire condition, whether the virtual firearm satisfies a second fire condition; and determine, when the virtual firearm satisfies the second fire condition, that the fire condition is satisfied.

[0129] In an exemplary embodiment, the shooting control module 904 is configured to: control, in a duration of the trigger signal, the virtual firearm to perform a shooting operation every preset time interval.

[0130] In an exemplary embodiment, as shown in FIG. 10, the apparatus 900 further includes a first position obtaining module 905, a distance obtaining module 906, and a button trigger module 907.

[0131] The first position obtaining module 905 is configured to obtain, when a touch operation signal is received, a touch position of the touch operation signal.

[0132] The distance obtaining module 906 is configured to obtain a distance between the touch position of the touch operation signal and a center position of the first fire button.

[0133] The button trigger module 907 is configured to determine, when the distance is less than a first threshold, that the trigger signal corresponding to the first fire button is received.

[0134] In an exemplary embodiment, as shown in FIG. 10, the apparatus 900 further includes a second position obtaining module 908 and a direction adjustment module 909.

[0135] The second position obtaining module 908 is configured to obtain a touch position corresponding to the trigger signal in a duration of the trigger signal.

[0136] The direction adjustment module 909 is configured to adjust a shooting direction of the virtual firearm according to the touch position corresponding to the trigger signal.

[0137] In an exemplary embodiment, the UI further includes a second fire button, and the second fire button is an operation control configured to trigger hip fire.

[0138] Correspondingly, the shooting control module 904 is further configured to control, when a trigger signal corresponding to the second fire button is received, the virtual firearm held by the virtual object to hip fire.

[0139] In an exemplary embodiment, as shown in FIG. 10, the apparatus further includes a fire detection module 910.

[0140] The fire detection module 910 is configured to detect whether the virtual firearm held by the virtual object supports ADS fire.

[0141] The ADS control module 902 is further configured to perform, when the virtual firearm supports the ADS fire and when the trigger signal corresponding to the first fire button is received, the operation of controlling a virtual firearm held by a virtual object to enter an ADS state.

[0142] In an exemplary embodiment, the fire detection module 910 is configured to:

[0143] obtain a firearm category to which the virtual firearm belongs;

[0144] obtain a setting option corresponding to the firearm category, the setting option being configured to set a fire manner, the fire manner including the ADS fire and hip fire; and

[0145] determine, when the setting option corresponding to the firearm category is the ADS fire, that the virtual firearm supports the ADS fire.

[0146] In summary, in the technical solutions provided in the embodiments of this application, a first fire button configured to trigger to ADS and fire is designed in a UI, and when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object is controlled to enter an ADS state, and the virtual firearm is controlled to shoot at the same time when the virtual firearm is in an ADS state, thereby implementing a one-tap ADS and fire capability, i.e., ADS and fire can be implemented by performing one operation, not two operations, thereby fully improving operation efficiency.

[0147] When the apparatus provided in the foregoing embodiments implements functions of the apparatus, the division of the foregoing functional modules is merely an example for description. In the practical application, the functions may be assigned to and completed by different functional modules according to the requirements, that is, the internal structure of the device is divided into different functional modules, to implement all or some of the functions described above. In addition, the apparatus and method embodiments provided in the foregoing embodiments belong to the same concept. For the specific implementation process, reference may be made to the method embodiments, and details are not described herein again.

[0148] FIG. 11 is a structural block diagram of a mobile terminal 1100 according to an embodiment of this application. The mobile terminal 1100 may be a portable electronic device such as a mobile phone, a tablet computer, a game console, an ebook reader, a multimedia playback device, and a wearable device. The mobile terminal is configured to implement the virtual object control method provided in the foregoing embodiments. The mobile terminal may be the mobile terminal 10 in the implementation environment shown in FIG. 1. Specifically:

[0149] Generally, the mobile terminal 1100 includes a processor 1101 and a memory 1102.

[0150] The processor 1101 may include one or more processing cores. For example, the processor may be a 4-core processor or an 8-core processor. The processor 1101 may be implemented by using at least one hardware form of a digital signal processor (DSP), a field programmable gate array (FPGA), and a programmable logic array (PLA). The processor 1101 may alternatively include a main processor and a coprocessor. The main processor is configured to process data in an active state, also referred to as a central processing unit (CPU). The coprocessor is a low-power processor configured to process data in a standby state. In some embodiments, the processor 1101 may be integrated with a graphics processing unit (GPU). The GPU is configured to render and draw content that needs to be displayed on a display. In some embodiments, the processor 1101 may further include an artificial intelligence (AI) processor. The AI processor is configured to process computing operations related to machine learning.

[0151] The memory 1102 may include one or more computer-readable storage media. The computer-readable storage medium may be non-transient. The memory 1102 may further include a high-speed random access memory (RAM) and a non-volatile memory, such as one or more magnetic disk storage devices or flash storage devices. In some embodiments, the non-transient computer-readable storage medium in the memory 1102 is configured to store at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being configured to be executed by one or more processors to implement the virtual object control method.

[0152] In some embodiments, the mobile terminal 1100 may optionally include a peripheral interface 1103 and at least one peripheral. The processor 1101, the memory 1102, and the peripheral interface 1103 may be connected through a bus or a signal cable. Each peripheral may be connected to the peripheral interface 1103 through a bus, a signal cable, or a circuit board. Specifically, the peripheral includes at least one of a radio frequency (RF) circuit 1104, a display screen 1105, a camera component 1106, an audio circuit 1107, a positioning component 1108, or a power supply 1109.

[0153] A person skilled in the art may understand that the structure shown in FIG. 11 does not constitute a limitation to the mobile terminal 1100, and the mobile terminal may include more or fewer components than those shown in the figure, or some components may be combined, or a different component arrangement may be used.

[0154] In an exemplary embodiment, a computer-readable storage medium is further provided, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set, when executed by a processor, implementing the virtual object control method.

[0155] Optionally, the computer-readable storage medium may include: a read-only memory (ROM), a RAM, a solid state drive (SSD), an optical disc, or the like. The RAM may include a resistive RAM (ReRAM) and a dynamic RAM (DRAM).

[0156] In an exemplary embodiment, a computer program product is further provided, the computer program product, when executed by a processor, being used for implementing the virtual object control method

[0157] "A plurality of" mentioned in the specification means two or more. "And/or" describes an association relationship for associated objects and represents that three relationships may exist. For example, A and/or B may represent the following three cases: only A exists, both A and B exist, and only B exists. The character "/" in this specification generally indicates an "or" relationship between the associated objects. In addition, the step numbers described in this specification merely exemplarily show a possible execution sequence of the steps. In some other embodiments, the steps may not be performed according to the number sequence. For example, two steps with different numbers may be performed simultaneously, or two steps with different numbers may be performed according to a sequence contrary to the sequence shown in the figure. This is not limited in the embodiments of this application.

[0158] The foregoing descriptions are merely exemplary embodiments of this application, but are not intended to limit this application. Any modification, equivalent replacement, or improvement made within the spirit and principle of this application shall fall within the protection scope of this application.

CLAIMS

What is claimed is:

1. A virtual object control method, applicable to a mobile terminal, the method comprising:

displaying a user interface (UI), wherein the UI comprises a first fire button and a second fire button disposed next to the first fire button, the first fire button comprising a first operation control configured to trigger to aim down sights (ADS) and fire, the second fire button comprising a second operation control configured to trigger hip fire, the first fire button being suitable for use in a medium distance or a long distance battle, and the second fire button being suitable for use in a close distance battle, wherein a size of the second fire button is less than a size of the first fire button;

controlling, when a trigger signal corresponding to the first fire button is received, a virtual firearm held by a virtual object to enter an ADS state, wherein the ADS state is a state of observing a virtual environment by using a virtual scope for the virtual firearm;

determining whether a fire condition is satisfied; and

controlling, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot,

wherein determining whether the fire condition is satisfied comprises:

determining whether the virtual object satisfies a first fire condition;

detecting, when the virtual object satisfies the first fire condition, whether the virtual firearm satisfies a second fire condition; and

determining, when the virtual firearm satisfies the second fire condition, that the fire condition is satisfied, and

wherein determining whether the virtual object satisfies the first fire condition comprises:

obtaining state information of the virtual object; and

detecting, according to the state information of the virtual object, whether the virtual object satisfies the first fire condition, wherein the first fire condition comprises at least one of the following: when the virtual object is alive, when the virtual object is not

driving a vehicle, or when the virtual object is not in water.

2. The method according to claim 1, wherein determining whether the virtual firearm satisfies the second fire condition comprises:

obtaining state information of the virtual firearm; and

detecting, according to the state information of the virtual firearm, whether the virtual firearm satisfies the second fire condition, wherein the second fire condition comprises at least one of the following: when the virtual firearm has bullets left, or when the virtual firearm is not reloading bullets.

3. The method according to claim 1, wherein controlling the virtual firearm to shoot comprises:

controlling, in a duration of the trigger signal, the virtual firearm to perform a shooting operation every preset time interval.

4. The method according to claim 1, further comprising:

obtaining, when a touch operation signal is received, a touch position of the touch operation signal;

obtaining a distance between the touch position of the touch operation signal and a center position of the first fire button; and

determining, when the distance is less than a first threshold, that the trigger signal corresponding to the first fire button is received.

5. The method according to claim 1, wherein after the controlling the virtual firearm held by the virtual object to enter the ADS state, the method further comprises:

obtaining a touch position corresponding to the trigger signal in a duration of the trigger signal; and

adjusting a shooting direction of the virtual firearm according to the touch position corresponding to the trigger signal.

6. The method according to any one of claims 1 to 5, wherein

the method further comprises:

controlling, when a trigger signal corresponding to the second fire button is received, the virtual firearm held by the virtual object to the hip fire.

7. The method according to any one of claims 1 to 5, further comprising:

detecting whether the virtual firearm held by the virtual object supports ADS fire; and

performing, when the virtual firearm supports the ADS fire and when the trigger signal corresponding to the first fire button is received, the operation of controlling the virtual firearm held by the virtual object to enter the ADS state.

8. The method according to claim 7, wherein the detecting whether the virtual firearm held by the virtual object supports the ADS fire comprises:

obtaining a firearm category to which the virtual firearm belongs;

obtaining a setting option corresponding to the firearm category, the setting option being configured to set a fire manner, the fire manner comprising the ADS fire and the hip fire; and

determining, when the setting option corresponding to the firearm category is the ADS fire, that the virtual firearm supports the ADS fire.

9. A virtual object control apparatus, comprising:

an interface display module, configured to display a user interface (UI), wherein the UI comprises a first fire button and a second fire button disposed next to the first fire button, the first fire button comprising a first operation control configured to trigger to aim down sights (ADS) and fire, the second fire button comprising a second operation control configured to trigger hip fire, the first fire button being suitable for use in a medium distance or a long distance battle, and the second fire button being suitable for use in a close distance battle, wherein a size of the second fire button is less than a size of the first fire button;

an ADS control module, configured to control, when a trigger signal corresponding to

the first fire button is received, a virtual firearm held by a virtual object to enter an ADS state, wherein the ADS state is a state of observing a virtual environment by using a virtual scope for the virtual firearm;

a condition detection module, configured to determine whether a fire condition is satisfied; and

a shooting control module, configured to control, when the fire condition is satisfied and when the virtual firearm is in the ADS state, the virtual firearm to shoot,

wherein the condition detection module is further configured to:

determine whether the virtual object satisfies a first fire condition;

detect, when the virtual object satisfies the first fire condition, whether the virtual firearm satisfies a second fire condition; and

determine, when the virtual firearm satisfies the second fire condition, that the fire condition is satisfied,

wherein to determine whether the virtual object satisfies the first fire condition, the condition detection module is further configured to:

obtain state information of the virtual object; and

detect, according to the state information of the virtual object, whether the virtual object satisfies the first fire condition, wherein the first fire condition comprises at least one of the following: when the virtual object is alive, when the virtual object is not driving a vehicle, or when the virtual object is not in water.

10. A mobile terminal, comprising a processor and a memory, the memory storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set perform the virtual object control method according to any one of claims 1 to 8.

11. A computer-readable storage medium, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by a processor to perform the virtual object control method according to any one of claims 1 to 8.