METHOD AND DEVICE FOR CONTROLLING SHOOTING PERFORMED WITH RESPECT TO VIRTUAL OBJECT, ELECTRONIC APPARATUS, AND STORAGE MEDIUM

RELATED APPLICATION

[0001] This disclosure claims priority to Chinese Patent Application No. 2019104654869, entitled "METHOD AND APPARATUS FOR CONTROLLING SHOOTING OF VIRTUAL OBJECT, ELECTRONIC DEVICE, AND STORAGE MEDIUM" filed with the China National Intellectual Property Administration on May 30, 2019, which is incorporated by reference in its entirety.

FIELD OF THE TECHNOLOGY

[0002] This disclosure relates to the field of computer technologies, and in particular, to a method and an apparatus for controlling shooting of a virtual object, an electronic device, and a storage medium.

BACKGROUND OF THE DISCLOSURE

[0003] With the development of computer technologies and diversification of terminal functions, various types of games can be played on a terminal. Shooting games are one of popular games. In shooting games, a user generally needs to control a virtual object to use a virtual item to shoot an opponent.

[0004] At present, in a method for controlling shooting of a virtual object, generally, a shooting button is provided, and the user may click and/or tap the shooting button, to control, upon detection of a long-press operation on the shooting button, the virtual object to shoot. However, the user needs to perform the long-press operation on the shooting button. In most cases, the user further needs to perform another control operation to perform another function, for example, to adjust a viewing angle. In this case, it is very inconvenient for the user to perform the another control operation simultaneously with the control operation to shoot. Therefore, there is a need for a method for controlling shooting of a virtual object to resolve the foregoing problem.

SUMMARY

[0005] According to embodiments provided in this disclosure, a method and an apparatus for controlling shooting of a virtual object, an electronic device, and a storage medium are provided. The technical solutions are described as follows:

[0006] A method for controlling shooting of a virtual object is provided, performed by an electronic device, the method including:

obtaining a locking area of a first virtual object; wherein the locking area is an area range around the first virtual object and used for triggering automatic shooting, when an aiming point of a second virtual object is in the locking area, the second virtual object enters a preparation state for determining whether to perform automatic shooting on the first virtual object;

displaying, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the locking complete information indicating that locking of the first virtual object is completed; and

in response to the locking of the first virtual object is completed and the aiming point is located in an under-attack area of the first virtual object, controlling automatic shooting of the second virtual object on the first virtual object~~, when the aiming point is located in an under-attack area of the first virtual object~~, a size of the under-attack area being less than a size of the locking area.

[0007] An apparatus for controlling shooting of a virtual object is provided, including:

an obtaining module, configured to obtain a locking area of a first virtual object; wherein the locking area is an area range around the first virtual object and used for triggering automatic shooting, when an aiming point of a second virtual object is in the locking area, the second virtual object enters a preparation state for determining whether to perform automatic shooting on the first virtual object;

a display module, configured to display, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the locking complete information indicating that locking of the first virtual object is completed; and

a control module, configured to control automatic shooting of the second virtual object on the first virtual object in response to the locking of the first virtual object is completed and the aiming point is located in an under-attack area of the first virtual object~~, when the aiming point~~

~~is located in an under-attack area of the first virtual object~~, a size of the under-attack area being less than a size of the locking area.

[0008] An electronic device is provided, including one or more processors and one or more memories, the one or more memories storing at least one computer-readable instruction, the computer-readable instruction being loaded and executed by the one or more processors to implement the operations performed in the method for controlling shooting of a virtual object.

[0009] One or more computer-readable storage media are provided, storing at least one computer-readable instruction, the computer-readable instruction being loaded and executed by one or more processors to implement the operations performed in the method for controlling shooting of a virtual object.

[0010] Details of one or more embodiments of this disclosure are provided in the accompanying drawings and descriptions below. Based on the specification, the accompanying drawings, and the claims of this disclosure, other features, objectives, and advantages of this disclosure become clearer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] To describe the technical solutions of the embodiments of this disclosure 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 disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

[0012] FIG. 1 is a schematic diagram of a terminal interface according to an embodiment of this disclosure.

[0013] FIG. 2 is a flowchart of a method for controlling shooting of a virtual object according to an embodiment of this disclosure.

[0014] FIG. 3 is a schematic diagram of a locking area according to an embodiment of this disclosure.

[0015] FIG. 4 is a schematic diagram of a locking area according to an embodiment of this disclosure.

[0016] FIG. 5 is a schematic diagram of locking preparation information according to an embodiment of this disclosure.

[0017] FIG. 6 is a schematic diagram of locking preparation information according to an embodiment of this disclosure.

[0018] FIG. 7 is a schematic diagram of locking complete information according to an embodiment of this disclosure.

[0019] FIG. 8 is a schematic diagram of locking complete information according to an embodiment of this disclosure.

[0020] FIG. 9 is a schematic diagram of an under-attack area according to an embodiment of this disclosure.

[0021] FIG. 10 is a schematic diagram of an under-attack area according to an embodiment of this disclosure.

[0022] FIG. 11 is a schematic diagram of automatic shooting according to an embodiment of this disclosure.

[0023] FIG. 12 is a schematic diagram of automatic shooting according to an embodiment of this disclosure.

[0024] FIG. 13 is a flowchart of a method for controlling shooting of a virtual object according to an embodiment of this disclosure.

[0025] FIG. 14 is a schematic structural diagram of an apparatus for controlling shooting of a virtual object according to an embodiment of this disclosure.

[0026] FIG. 15 is a schematic structural diagram of an electronic device according to an embodiment of this disclosure.

DESCRIPTION OF EMBODIMENTS

[0027] To make objectives, technical solutions, and advantages of this disclosure clearer, the following further describes implementations of this disclosure in detail with reference to the accompanying drawings. It is to be understood that the specific implementations described herein are merely used for describing this disclosure, instead of limiting this disclosure.

[0028] Embodiments of this disclosure mainly relate to a video game scene or a simulation training scene. Using the video game scene as an example, a user may perform an operation on a terminal in advance. After detecting the operation of the user, the terminal may download a game configuration file of the video game. The game configuration file may include an application program, interface display data, virtual scene data, or the like of the video game, so that the user can

invoke the game configuration file while logging in to the video game on the terminal, to render and display an interface of the video game. The user may perform a touch operation on the terminal, and after detecting the touch operation, the terminal may determine game data corresponding to the touch operation and render and display the game data. The game data may include virtual scene data, behavioral data of a virtual object in the virtual scene, and the like.

[0029] The virtual scene in this disclosure may be used for simulating a three-dimensional virtual space, a two-dimensional virtual space, or a 2.5-dimensional virtual space. The virtual space may be an open space. The virtual scene may be used for simulating a real environment in reality. For example, the virtual scene may include the sky, the land, the ocean, or the like. The land may include environmental elements such as the desert and a city. The user may control the virtual object to move in the virtual scene. The virtual object may be a virtual image used for representing the user, or may be a virtual image used for representing a creature in association with the user, for example, a pet. The virtual image may be in any form, for example, a human or an animal, and is not limited in this disclosure.

[0030] The virtual scene may further include another virtual object. That is, the virtual scene may include a plurality of virtual objects. Each virtual object has a shape and a volume of the virtual object in the virtual scene, and occupies a part of the space in the virtual scene. Using a shooting game as an example, the user may control the virtual object to freely fall, glide, or open a parachute to fall in the sky of the virtual scene, or run, jump, crawl, or stoop to move forward on the land, or may control the virtual object to swim, float, or dive in the ocean. The user may alternatively control the virtual object to take a vehicle to move in the virtual scene. The foregoing scenes are merely used as an example for description, and this is not specifically limited in the embodiments of this disclosure. The user may further control the virtual object to fight against another virtual object by using a virtual item. The virtual item may be a cold weapon, or may be a hot weapon, and is not specifically limited in the embodiments of this disclosure.

[0031] Generally, a terminal screen displays a viewing angle picture of a virtual object currently controlled by a terminal. The terminal screen may further display an aiming point of the virtual object currently controlled by the terminal. The aiming point may be used for annotating an aiming target in the viewing angle picture of the virtual object currently controlled by the terminal. In this case, a position of the aiming point in the virtual scene may be used as an attack point of the virtual object currently controlled by the terminal.

[0032] Specifically, the aiming point may be displayed at a center position of the terminal screen. The aiming point may be alternatively displayed in another position, and this is not

specifically limited in the embodiments of this disclosure. The aiming point may have a plurality of display styles. In this case, the aiming point may be displayed in a default display style of a system, or may be displayed in a display style adjusted according to a user setting. Based on the aiming point displayed on the terminal, the user may determine whether a position currently corresponding to the aiming point in the virtual scene is an area at which the user wants to aim. If not, the user may adjust a viewing angle of the virtual scene by performing a viewing angle adjustment operation, to adjust the area aimed at by the aiming point. It is desirable to adjust the aiming point onto another virtual object in the virtual scene quickly and accurately, to perform an operation such as shooting, slapping, or boxing on the another virtual object.

[0033] In the embodiments of this disclosure, using the terminal described above being a terminal of a user as an example, the another virtual object may be referred to as a first virtual object, and the virtual object controlled by the terminal of the user is referred to as a second virtual object. In the terminal of the user, the virtual scene may be displayed at any viewing angle, and the displayed virtual scene may include the first virtual object located in the display area.

[0034] For example, as shown in FIG. 1, the terminal may display a viewing angle picture of the second virtual object in a user graphical interface, the viewing angle picture may include a virtual scene, and the virtual scene may include the first virtual object, and may further include the second virtual object.

[0035] Generally, when a virtual scene is displayed in the shooting game, two display manners may be included: a first-person viewing angle and a third-person viewing angle. The first-person viewing angle is used for simulating a viewing angle of the virtual object to observe the virtual scene, and in the display manner of the first-person viewing angle, a virtual camera may be generally located at an eye of the virtual object, or at a surrounding area of the eye of the virtual object, for example, a head or a chest of the virtual object. The third-person viewing angle is used for simulating a viewing angle from a position around the virtual object to observe the virtual scene, and in the display manner of the third-person viewing angle, the virtual camera may be generally located at a back of the virtual object, to display the virtual object in the virtual scene, so that the user may see actions of the virtual object and an environment in which the virtual object is located in the virtual scene.

[0036] FIG. 2 is a flowchart of a method for controlling shooting of a virtual object according to an embodiment of this disclosure. The method is applicable to an electronic device, and the electronic device being a terminal is merely used as an example for description herein. Referring to FIG. 2, the method includes the following steps:

[0037] 201. A terminal obtains a locking area of a first virtual object.

[0038] The terminal may provide an automatic shooting function. With the automatic shooting function, the virtual object may perform automatic shooting without a shooting operation of the user. In an embodiment of this disclosure, a trigger condition may be set for the automatic shooting function. The trigger condition may be that locking of the first virtual object is completed. Therefore, the terminal needs to first determine, according to a user operation, whether the locking of the first virtual object is completed.

[0039] In an embodiment, before step 201, the terminal may determine whether the first virtual object is included in the viewing angle picture of the second virtual object. If a view-angle range of the second virtual object includes the first virtual object, the terminal may perform Step 201 of obtaining the locking area of the first virtual object, to determine, according to the locking area, whether the first virtual object can be locked, to determine whether to provide the automatic shooting function. However, if the viewing angle picture of the second virtual object does not include the first virtual object, the second virtual object does not have a shooting target, and there is no need to provide the automatic shooting function. Therefore, there is no need to perform step 201.

[0040] The locking area is an area range around the first virtual object and used for locking the first virtual object. A size of the locking area of the first virtual object is greater than that of an under-attack area of the first virtual object, and less than the view-angle range of the second virtual object. The locking area is a preparation area used for triggering automatic shooting. When an aiming point of the second virtual object is in the locking area, that means, the second virtual object enters a preparation state for determining whether to perform automatic shooting on the first virtual object. When the aiming point of the second virtual object enters the under-attack area of the first virtual object, the second virtual object is instantly triggered to perform automatic shooting.

[0041] In an example embodiment, the locking area may be an area with the first virtual object being the center. A shape of the locking area may be a cylinder, a sphere, another regular shape, or another irregular shape. A specific shape of the locking area may be set by a person skilled in the art as appropriate, and is not limited in an embodiment of this disclosure.

[0042] In an embodiment, the terminal may obtain the locking area of the first virtual object according to a distance between the first virtual object and the second virtual object, a size of the locking area being positively correlated with the distance. That is, when the distance is larger, the size of the locking area is larger. When the distance is smaller, the size of the locking area is smaller. In this way, when the distance between the first virtual object and the second virtual object is large, while a display size of the first virtual object is very small, and a display size of the locking

area of the first virtual object may not be excessively small, so that the user may easily move the position of the aiming point into the locking area of the first virtual object through an operation, to aim and shoot the first virtual object.

[0043] Some virtual items may perform the automatic shooting function, whereas some other virtual items cannot support the automatic shooting function. For example, some virtual items can perform continuous shooting, whereas some other virtual items may only perform single-shot shooting. The automatic shooting function is mainly used for the virtual items that can perform continuous shooting. Therefore, types of the virtual items that provide the automatic shooting function may be set.

[0044] Specifically, the terminal may obtain a type of a virtual item controlled by the second virtual object, and perform step 201 and the operations of obtaining a locking area, displaying locking complete information, and controlling automatic shooting when the type of the virtual item is a target type. When the type is not the target type, the terminal may skip step 201, and does not need to perform the subsequent operations of displaying locking complete information and controlling automatic shooting. The type of the virtual item and the target type may be set by a person skilled in the art as appropriate, or may be set by the user according to a use habit of the user, and this is not limited in an embodiment of this disclosure.

[0045] In an embodiment, if the first virtual object is completely occluded by a virtual article in a virtual scene in the viewing angle picture of the second virtual object, the user actually cannot see the first virtual object, and there is no need to provide the automatic shooting function. Therefore, the terminal may first determine whether the first virtual object is completely occluded, and if not, the terminal may provide the automatic shooting function. That is, the operations of obtaining a locking area, displaying locking complete information, and controlling automatic shooting are performed when the first virtual object is not completely occluded in a viewing angle of the second virtual object. However, when the first virtual object is completely occluded, the terminal does not need to provide the automatic shooting function.

[0046] Specifically, the complete occlusion may be determined in the following manner: when any connecting line between a virtual camera of the second virtual object and the first virtual object does not pass through a virtual article in a virtual scene, the terminal may perform the operations of obtaining a locking area, displaying locking complete information, and controlling automatic shooting. However, when all connecting lines between the virtual camera of the second virtual object and the first virtual object pass through a virtual article in the virtual scene, the

terminal does not need to perform the operations of obtaining a locking area, displaying locking complete information, and controlling automatic shooting.

[0047] 202. The terminal obtains a position of an aiming point of a second virtual object, performs step 203 when the aiming point is located in the locking area, and continues to perform steps 201 and 202 when the aiming point is located outside the locking area.

[0048] The terminal may obtain the position of the aiming point of the second virtual object, to determine a positional relationship between the aiming point and the locking area of the first virtual object. The user may have different operation intentions based on different positional relationships, and results of determining whether the automatic shooting function needs to be provided are also different according to the different positional relationships.

[0049] The positional relationship may include two types: In the first type, the aiming point is located in the locking area, and the aiming point is relatively close to the first virtual object. It indicates that the user may want to aim at the first virtual object, the following step 203 may then be performed, to further determine the operation intention of the user. In the second type, the position of the aiming point is located outside the locking area, and the aiming point is relatively far away from the first virtual object. It indicates that the user may not want to aim at the first virtual object, so that there is no need to provide the automatic shooting function. Therefore, steps 201 and 202 may continue to be performed to re-determine the positional relationship between the aiming point and the locking area, to determine whether the user intends to aim at the first virtual object.

[0050] In an embodiment, the position of the aiming point obtained by the terminal may be in the form of coordinates, and the obtained locking area may be in the form of a coordinate range. The terminal may determine whether position coordinates of the aiming point are within the coordinate range of the locking area. If yes, it is determined that the aiming point is located in the locking area, and if not, it is determined that the aiming point is located outside the locking area. For example, as shown in FIG. 3, the locking area may be an area around the first virtual object, and the aiming point may be in the locking area. From another viewing angle, as shown in FIG. 4, in an actual virtual scene, the aiming point is in the locking area.

[0051] In another possible implementation, the determining process may be further implemented by using ray detection. The terminal may emit a ray in a viewing angle direction from a position of the aiming point, and return an identifier of the locking area or a collision result when the ray collides with the locking area, to determine that the aiming point is located in the locking area; and if there is no collision, the aiming point is located outside the locking area. The process of

emitting the ray may be implemented by invoking an interface of Unity, which is a product launched by the Unity company.

[0052] A sequence of performing steps 201 and 202 may be random. Specifically, the terminal may first perform step 201 and then perform step 202, or may first perform step 202 and then perform step 201, or may perform steps 201 and 202 simultaneously. The sequence of performing steps 201 and 202 is not limited in an embodiment of this disclosure.

[0053] 203. The terminal starts timing, and performs step 204 or step 207 according to different cases in a timing process.

[0054] When it is determined that the aiming point is located in the locking area, the terminal may start timing to further determine whether the user is aiming at the first virtual object. If the aiming point remains in the locking area for a period of time, it indicates that the user may be aiming at the first virtual object; and if the aiming point moves outside the locking area, it indicates that the user may not be aiming at the first virtual object. Based on such a principle, target duration may be set, to determine, according to a case within the target duration after the start of the timing, whether to provide the automatic shooting function. For a detailed description, reference may be made to the following steps 204 and 207.

[0055] In an embodiment, after the terminal starts timing, the terminal may display locking preparation information at the position of the aiming point of the second virtual object. The locking preparation information is used for indicating that locking of the first virtual object is being prepared. The user can learn about a condition for locking the first virtual object by observing the displayed locking preparation information, and can continue to control the aiming point around the first virtual object, or move the aiming point onto the first virtual object.

[0056] The locking preparation information may be in the form of graphics, text, or special effects. In an example embodiment, the locking preparation information may include a plurality of triangles displayed at the position of the aiming point, and the plurality of triangles are all facing the position of the aiming point. For example, as shown in FIG. 5, the terminal may display triangular graphics at the position of the aiming point, to indicate locking of the first virtual object is being prepared, and an actual terminal interface may be shown in FIG. 6.

[0057] 204. The terminal displays locking complete information at the position of the aiming point, when the timing reaches target duration.

[0058] When it is determined that the user is continuously aiming at the first virtual object until the timing reaches the target duration, the automatic shooting function can be provided. The

terminal displays the locking complete information at the position of the aiming point, the locking complete information indicating that locking of the first virtual object is completed. If the condition for automatic shooting is met later, the second virtual object may be controlled to perform automatic shooting.

[0059] The target duration may be set by a person skilled in the art as appropriate or by the user, and is not limited in an embodiment of this disclosure. For example, there may be a conversion relationship between the target duration, the size of the locking area, and a size of the following under-attack area. In an example, the target duration may be set based on an estimated time to be taken for the user to move the aiming point from the locking area to the under-attack area through a normal aiming operation is the target duration. In another example, the target duration may be alternatively set by a person skilled in the art randomly.

[0060] In an example embodiment, the locking complete information may include a plurality of triangles, and the plurality of triangles are all facing the position of the aiming point. In an embodiment, a display style of the locking complete information may be different from a display style of the locking preparation information. For example, the display styles may have different colors, and distances between the display position of the information and the position of the aiming point may be different. For example, as shown in FIG. 7, the terminal may display a plurality of triangles at the position of the aiming point, and distances between the plurality of triangles and the position of the aiming point are closer than those in FIG. 5, that is, the triangles are indented. In addition, the color may be changed, although the change in color is not shown in the figure, and an example terminal interface may be shown in FIG. 8.

[0061] Steps 203 and 204 are the process of displaying, when an aiming point of a second virtual object remains in the locking area for a target duration, the locking complete information at the position of the aiming point. In the process, it is determined, by using two dimensions, namely, the positional relationship between the aiming point and the first virtual object and the duration for which the aiming point and the first virtual object maintain the positional relationship, whether the locking of the first virtual object is completed. Steps 203 and 204 are performed in a case in which specific conditions are met, to display the locking complete information at the position of the aiming point. However, if any of the above conditions of the two dimensions is not met, the terminal does not need to display the locking complete information at the position of the aiming point, for example, when the aiming point is located outside the locking area in the foregoing step 202 or the following step 207. Alternatively, the terminal may display locking failure prompt information.

[0062] 205. The terminal controls, when the aiming point is located in an under-attack area of the first virtual object, the second virtual object to perform automatic shooting.

[0063] The under-attack area is an area into which shooting can be performed by an opponent. When the aiming point of the second virtual object is located in the under-attack area of the first virtual object and the automatic shooting is triggered, shooting can be performed by the second virtual object on the first virtual object.

[0064] The size of the under-attack area is less than the size of the locking area.

[0065] After displaying the locking complete information at the position of the aiming point, the terminal has provided the automatic shooting function, and further needs to determine whether the aiming point is in the under-attack area of the first virtual object, to determine whether to control the second virtual object to perform automatic shooting.

[0066] Before step 205, the terminal may further obtain the under-attack area of the first virtual object. The size of the under-attack area is less than the size of the locking area. That is, when locking of the first virtual object is completed and the user wants to perform shooting on the first virtual object, the aiming point needs to be moved to a position closer to the first virtual object, so that the under-attack area may be set, and the size of the under-attack area is less than the size of the locking area.

[0067] In an embodiment, based on different distances between the first virtual object and the second virtual object, the under-attack area may have different sizes. The terminal may obtain an under-attack area of the first virtual object according to a distance between the first virtual object and the second virtual object, a size of the under-attack area being positively correlated with the distance. That is, when the distance is larger, the size of the under-attack area is larger, and when the distance is smaller, the size of the under-attack area is smaller.

[0068] Specifically, the terminal may obtain a target size of the under-attack area according to the distance between the first virtual object and the second virtual object, and obtain an area with the first virtual object being the center and a size being the target size as the under-attack area of the first virtual object. In this way, the under-attack area is a smaller area around the first virtual object than the locking area. If the user wants to aim at the first virtual object, the user may move the aiming point into the under-attack area, so that the terminal may control the second virtual object to perform automatic shooting. An area containing the first virtual object is used as the under-attack area. Accordingly, the problem that the automatic shooting may be easily stopped due to inaccurate user operations to aim at the first virtual object in the case of using the area of the first virtual object

as the under-attack area is solved, thereby effectively improving continuity of automatic shooting and greatly improving user experience. In addition, through the foregoing process of triggering particular conditions to display the locking complete information at the position of the aiming point, convenient operations are provided, and meanwhile, fairness of video games is ensured.

[0069] A shape of the under-attack area may be a cube, a sphere, an ellipsoid, another regular shape, or another irregular shape. The shape of the under-attack area may be defined by a person skilled in the art as appropriate, and is not limited in an example embodiment of this disclosure. For example, as shown in FIG. 9 and FIG. 10, using the under-attack area having a shape of an ellipsoid containing the first virtual object as an example, the size of the under-attack area is greater than the size of the first virtual object.

[0070] An example in which the terminal obtains the under-attack area according to the distance between the first virtual object and the second virtual object is merely used for description above. In another possible implementation, the size of the under-attack area may be fixed, and the terminal directly obtains an area with a preset size as the under-attack area. Through the foregoing step 204, the locking complete information is displayed at the position of the aiming point. In this case, the aiming point may be already located in the under-attack area of the first virtual object, and the terminal may control the second virtual object to perform automatic shooting; or the aiming point may be outside the under-attack area at that time, but the user may move the aiming point into the under-attack area by changing the position of the aiming point, so that the terminal may control the second virtual object to perform automatic shooting.

[0071] Similarly, the process for the terminal to determine whether the aiming point is located in the under-attack area is the same as the process for the terminal to determine whether the aiming point is located in the locking area in the foregoing step 202, and may include at least two implementations. In an example embodiment, the foregoing step of obtaining the under-attack area by the terminal may be performed when step 201 is performed, and the terminal may determine, by using ray detection, an area in which the aiming point is currently located. Specifically, different levels may be set for the two areas, a ray is emitted from the aiming point, and it may be determined, according to a level from which the ray returns, whether the aiming point is located in the locking area or the under-attack area. Because the size of the under-attack area is less than the size of the locking area, the locking area may include the under-attack area. If the aiming point is located in the under-attack area, the aiming point is also located in the locking area.

[0072] For example, as shown in FIG. 11, the locking of the first virtual object is completed and the aiming point is located in the under-attack area, the terminal controls the second virtual

object to perform automatic shooting, and an example terminal interface may be shown in FIG. 12. In another specific example, initially there may be a virtual article between the first virtual object and the second virtual object. As a result, the first virtual object may be invisible in the viewing angle picture of the second virtual object. However, the first virtual object may suddenly appear in the viewing angle picture of the second virtual object after moving. By determining the target duration, a reaction time for a person to make a shooting action in such a scene as a real scene may be simulated. In an example, the display styles of the locking complete information and the aiming point during automatic shooting may be different from display styles in a normal state.

[0073] The above describes an example in which the terminal controls the second virtual object to perform automatic shooting upon particular conditions being met. The user may not want to shoot the first virtual object, and may move the aiming point to another position. When the aiming point is moved outside the locking area of the first virtual object, the first virtual object no longer meets the locking conditions. Therefore, the terminal may cancel the display of the locking complete information, and does not need to perform step 205.

[0074] 206. The terminal controls, when a stop condition is met, the second virtual object to stop automatic shooting.

[0075] The stop condition may further be set, to trigger the terminal, which currently performs automatic shooting, to control the second virtual object to stop automatic shooting. Specifically, there may be a plurality of types of stop conditions. When any one of the stop conditions is met, the terminal may control the second virtual object to stop automatic shooting. Step 206 may be any one of the following steps 1 to 4:

[0076] Step 1. The terminal controls, based on detecting that the aiming point moves outside the under-attack area of the first virtual object, the second virtual object to stop automatic shooting.

[0077] In step 1, in the automatic shooting process, the first virtual object may be moved, and the user may change the position of the aiming point. As a result, the aiming point moves outside the under-attack area. In this case, the condition for the automatic shooting is no longer met, and the terminal may control the second virtual object to stop automatic shooting.

[0078] Step 2. The terminal controls, when a quantity of projectiles of the virtual item controlled by the second virtual object is zero, the second virtual object to stop automatic shooting.

[0079] In step 2, in the automatic shooting process, the quantity of the projectiles of the virtual item controlled by the second virtual object may drop to zero, and the shooting cannot be continued. Therefore, the terminal may control the second virtual object to stop automatic shooting.

[0080] Step 3. The terminal controls, when the first virtual object is completely occluded, the second virtual object to stop automatic shooting.

[0081] In step 3, in the automatic shooting process, the first virtual object or the second virtual object may be moved. As a result, the first virtual object may be completely occluded by a virtual article in the virtual scene, and the first virtual object may disappear in the viewing angle picture of the second virtual object. In this case, the second virtual object no longer needs to perform shooting, the shooting cannot cause damage to the first virtual object, and the terminal may control the second virtual object to stop automatic shooting.

[0082] Step 4. The terminal controls, when the first virtual object is in an eliminated state or a seriously injured state, the second virtual object to stop automatic shooting.

[0083] In step 4, in the automatic shooting process, the first virtual object is in the eliminated state, and the second virtual object then loses a target that needs to be shot. Therefore, the terminal may control the second virtual object to stop automatic shooting. Alternatively, the first virtual object is in the seriously injured state, and the first virtual object is already at an extreme disadvantage. The terminal may control the second virtual object to stop automatic shooting, and the user manually controls the second virtual object to perform shooting, which provides simplified operations and convenience, and meanwhile, ensures the fairness of video games.

[0084] 207. The terminal ends the timing, when the aiming point moves outside the locking area before the timing reaches the target duration.

[0085] When the timing does not reach the target duration but the aiming point moves outside the locking area, it indicates that the user may not want to aim at the first virtual object, or the user may have lost an opportunity to lock the first virtual object due to an operation error. In this case, the terminal may end the timing. That is, the process of locking the first virtual object at this time fails.

[0086] The above is a process of locking one first virtual object and providing the automatic shooting function. The viewing angle picture of the second virtual object may include a plurality of first virtual objects. In this case, a target switching condition may be further set. If the first virtual object and the second virtual object meet a specific condition, after one of the first virtual objects is shot, another first virtual object may be locked without a limit of the target duration again, and the automatic shooting function may be provided if the positional relationship between the aiming point and the locking area meets the condition.

[0087] Specifically, the terminal may continuously display the locking complete information at the position of the aiming point when a view-angle range of the second virtual object includes a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in a locking area of another first virtual object.

[0088] In a specific embodiment, the terminal may control the second virtual object to continuously perform automatic shooting, when a view-angle range of the second virtual object includes a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in an under-attack area of another first virtual object.

[0089] A specific process of the foregoing method for controlling shooting of a virtual object is described below by using a specific example through FIG. 13. Referring to FIG. 13, in this example, shooting is referred to as "fire", the automatic shooting function may correspond to a switch button, and the user may turn on or off the automatic shooting function by operating the switch button. In an embodiment of this disclosure, the user may first turn on an autofire setting, and the terminal may determine whether a weapon (a virtual item) meets an autofire condition. This step is to determine whether a type of the virtual item is a target type. In a project, attributes may be configured for each weapon through initialization (ini), an autofire attribute is added to configuration attributes of ini, and it may be subsequently determined, based on the autofire attribute, whether to perform autofire. The configuration may be performed in another manner. When it is determined that the weapon does not meet the autofire condition, the terminal does not need to continue to perform determining or provide the autofire function. However, if the weapon meets the autofire condition, it may be detected, by using a ray, whether a locking frame (that is, the locking area) on an enemy is being aimed at. If not, the terminal does not need to continue to perform determining; and if yes, the terminal may enter a fire countdown state, that is, start timing. The terminal may determine whether the countdown ends. When the countdown ends, it may be determined whether a damage collision detection frame (that is, the under-attack area) is being aimed at (e.g., within the target duration). If yes, the terminal may open fire; and if the damage collision detection frame is not being aimed at, the determining may be continued. It is determined above whether the countdown ends, and if not, the determining may be continued. After the terminal controls to open fire, the terminal may detect whether the ray leaves the damage collision detection frame or whether bullets are exhausted. If yes, the terminal may hold fire; and if not, the terminal may continuously open fire.

[0090] In an embodiment of this disclosure, it is determined, according to the positional relationship between the aiming point of the second virtual object and the locking area and the duration for which the positional relationship is maintained, whether the locking complete information is displayed at the position of the aiming point. That is, it is determined whether the locking of the first virtual object is completed. If the locking is completed and the aiming point is in the under-attack area of the first virtual object, the second virtual object may be controlled to perform automatic shooting. An automatic shooting function is provided, so that no complex operations are required, and there is no conflict with other operations. The operations are convenient and fast, and the efficiency of controlling shooting of a virtual object is improved.

[0091] All the optional technical solutions may be combined randomly to form optional embodiments of this disclosure. Details are not described herein.

[0092] It is to be understood that, although the steps are displayed sequentially according to the instructions of the arrows in the flowcharts of the embodiments, these steps are not necessarily performed sequentially according to the sequence instructed by the arrows. Unless otherwise explicitly specified in this disclosure, execution of the steps is not strictly limited, and the steps may be performed in other sequences. Moreover, at least some of the steps in each embodiment may include a plurality of sub-steps or a plurality of stages. The sub-steps or stages are not necessarily performed at the same moment but may be performed at different moments. Execution of the sub-steps or stages is not necessarily sequentially performed, but may be performed alternately with other steps or at least some of sub-steps or stages of other steps.

[0093] FIG. 14 is a schematic structural diagram of an apparatus for controlling shooting of a virtual object according to an embodiment of this disclosure. The apparatus may be disposed on the electronic device in the foregoing embodiment. Referring to FIG. 14, the apparatus includes:

an obtaining module 1401, configured to obtain a locking area of a first virtual object;

a display module 1402, configured to display, when an aiming point of a second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point, the locking complete information indicating that locking of the first virtual object is completed; and

a control module 1403, configured to control automatic shooting of the second virtual object, when the aiming point is located in an under-attack area of the first virtual object, a size of the under-attack area being less than a size of the locking area.

[0094] In an embodiment, the display module 1402 is configured to:

start timing, when the aiming point of the second virtual object is located in the locking area; and

displaying the locking complete information at the position of the aiming point, when the timing reaches the target duration.

[0095] In an embodiment, the display module 1402 is further configured to display locking preparation information at the position of the aiming point of the second virtual object.

[0096] In an embodiment, the display module 1402 is further configured to end the timing, when the aiming point moves outside the locking area before the timing reaches the target duration.

[0097] In some embodiments, the obtaining module 1401 is further configured to obtain a type of a virtual item controlled by the second virtual object; and

the obtaining module 1401, the display module 1402, and the control module 1403 are further configured to respectively perform the operations of obtaining the locking area, displaying the locking complete information, and controlling the automatic shooting, when the type is a target type.

[0098] In an embodiment, the obtaining module 1401, the display module 1402, and the control module 1403 are further configured to respectively perform the operations of obtaining the locking area, displaying the locking complete information, and controlling the automatic shooting, when the first virtual object is not completely occluded in a viewing angle of the second virtual object.

[0099] In an embodiment, the control module 1403 is further configured to perform any one of the following:

controlling, when detecting that the aiming point moves outside the under-attack area of the first virtual object, the second virtual object to stop automatic shooting;

controlling, when a quantity of projectiles of a virtual item controlled by the second virtual object is zero, the second virtual object to stop automatic shooting;

controlling, when the first virtual object is completely occluded, the second virtual object to stop automatic shooting; and

controlling, when the first virtual object is in an eliminated state or a seriously injured state, the second virtual object to stop automatic shooting.

[0100] In an embodiment, the display module 1402 is further configured to continuously display the locking complete information at the position of the aiming point, when a view-angle range of the second virtual object includes a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in a locking area of another first virtual object.

[0101] In an embodiment, the control module 1403 is further configured to control the second virtual object to continuously perform automatic shooting, when a view-angle range of the second virtual object includes a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in an under-attack area of another first virtual object.

[0102] In an embodiment, the obtaining module 1401 is further configured to obtain the under-attack area of the first virtual object according to a distance between the first virtual object and the second virtual object, a size of the under-attack area being positively correlated with the distance.

[0103] The obtaining module 1401 is further configured to obtain the locking area of the first virtual object according to the distance between the first virtual object and the second virtual object, a size of the locking area being positively correlated with the distance.

[0104] In an embodiment, the obtaining module 1401 is further configured to: obtain a target size of the under-attack area according to the distance between the first virtual object and the second virtual object; and obtain an area with the first virtual object being a center and a size being the target size as the under-attack area of the first virtual object.

[0105] By using the apparatus provided in an embodiment of this disclosure, it is determined, according to the positional relationship between the aiming point of the second virtual object and the locking area and the duration for which the positional relationship is maintained, whether the locking complete information is displayed at the position of the aiming point. That is, it is determined whether the locking of the first virtual object is completed. If the locking is completed and the aiming point is in the under-attack area of the first virtual object, the second virtual object may be controlled to perform automatic shooting. An automatic shooting function is provided, so that no complex operations are required, and there is no conflict with other operations. The operations are convenient and fast, and the efficiency of controlling shooting of a virtual object is improved.

[0106] When the apparatus for controlling shooting of a virtual object provided in the foregoing embodiment controls the virtual object to shoot, only division of the foregoing functional modules is used as an example for description. In the practical application, the functions may be allocated to and completed by different functional modules depending on embodiments. That is, an internal structure of the electronic device is divided into different functional modules, to complete all or some of the functions described above. In addition, the apparatus for controlling shooting of a virtual object and the method for controlling shooting of a virtual object embodiments provided in the foregoing embodiments belong to the same concept. For a specific implementation process, refer to the method embodiment, and details are not described herein again.

[0107] FIG. 15 is a schematic structural diagram of an electronic device according to an embodiment of this disclosure. The electronic device 1500 may vary a lot due to different configurations or performance, and may include one or more processors (central processing units, CPUs) 1501 and one or more memories 1502. The one or more memories 1502 stores at least one computer-readable instruction, the at least one computer-readable instruction being loaded and executed by the one or more processors 1501 to implement the method for controlling shooting of a virtual object provided in the foregoing method embodiments. The electronic device 1500 may further include components such as a wired or wireless network interface, a keyboard, and an input/output (I/O) interface, to facilitate input and output. The electronic device 1500 may further include another component configured to implement a function of a device. Details are not further described herein.

[0108] In an exemplary embodiment, a computer-readable storage medium, for example, a memory including computer-readable instructions, is further provided. The computer-readable instructions may be executed by a processor to implement the method for controlling shooting of a virtual object in the foregoing embodiment. For example, the computer-readable storage medium may be a read-only memory (ROM), a RAM, a compact disc ROM (CD-ROM), a magnetic tape, a floppy disk, an optical data storage device, or the like.

[0109] A person of ordinary skill in the art may understand that all or some of the steps of the foregoing embodiments may be implemented by using hardware, or may be implemented by a program instructing related hardware. The program may be stored in a computer-readable storage medium. The above-mentioned storage medium may be a ROM, a magnetic disk, an optical disc, or the like.

[0110] The foregoing descriptions are merely exemplary embodiments of this disclosure, but are not intended to limit this disclosure. Any modification, equivalent replacement, or

improvement made within the spirit and principle of this disclosure shall fall within the protection scope of this disclosure.

CLAIMS

What is claimed is:

1. A method for controlling shooting of a virtual object, performed by an electronic device, the method comprising:

obtaining a locking area of a first virtual object; wherein the locking area is an area range around the first virtual object and used for triggering automatic shooting, when an aiming point of a second virtual object is in the locking area, the second virtual object enters a preparation state for determining whether to perform automatic shooting on the first virtual object;

displaying, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the locking complete information indicating that locking of the first virtual object is completed; and

in response to the locking of the first virtual object is completed and the aiming point is located in an under-attack area of the first virtual object, controlling automatic shooting of the second virtual object on the first virtual object, ~~when the aiming point is located in an under-attack area of the first virtual object,~~ a size of the under-attack area being less than a size of the locking area.

2. The method according to claim 1, wherein before the displaying, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the method further comprises:

determining that the aiming point is located in the locking area, when position coordinates of the aiming point of the second virtual object are within a coordinate range of the locking area.

3. The method according to claim 1, wherein before the displaying, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the method further comprises:

emitting a ray in a viewing angle direction from the position of the aiming point of the second virtual object; and

determining that the aiming point is located in the locking area, when the ray collides with the locking area.

4. The method according to claim 1, wherein the displaying, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area comprises:

starting timing, when the aiming point of the second virtual object is located in the locking area; and

displaying the locking complete information at the position of the aiming point in the locking area, when the timing reaches the target duration.

5. The method according to claim 4, wherein after the starting timing, the method further comprises:

displaying locking preparation information at the position of the aiming point of the second virtual object.

6. The method according to claim 5, wherein the locking preparation information includes at least two triangles displayed at the position of the aiming point and facing the position of the aiming point.

7. The method according to claim 6, wherein the locking complete information includes at least two triangles displayed at the position of the aiming point and facing the position of the aiming point, and a display style of the at least two triangles used in the locking complete information is different from a display style of the at least two triangles used in the locking preparation information.

8. The method according to claim 4, wherein after the starting timing, the method further comprises:

ending the timing, when the aiming point moves outside the locking area before the timing reaches the target duration.

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

obtaining a type of a virtual item controlled by the second virtual object; and

performing the operations of obtaining the locking area, displaying the locking complete information, and controlling the automatic shooting, when the type is a target type.

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

performing the operations of obtaining the locking area, displaying the locking complete information, and controlling the automatic shooting, when the first virtual object is not completely occluded in a viewing angle of the second virtual object.

11. The method according to claim 10, further comprising:

determining that the first virtual object is not completely occluded, when any connecting line

between a virtual camera of the second virtual object and the first virtual object does not pass through a virtual article in a virtual scene; and

determining that the first virtual object is completely occluded, when all connecting lines between the virtual camera of the second virtual object and the first virtual object pass through a virtual article in the virtual scene.

12. The method according to claim 1, wherein after the controlling automatic shooting of the second virtual object, the method further comprises any one of the following:

controlling, when the aiming point moves outside the under-attack area of the first virtual object, the second virtual object to stop automatic shooting;

controlling, when a quantity of projectiles of a virtual item controlled by the second virtual object is zero, the second virtual object to stop automatic shooting;

controlling, when the first virtual object is completely occluded, the second virtual object to stop automatic shooting; and

controlling, when the first virtual object is in an eliminated state or a seriously injured state, the second virtual object to stop automatic shooting.

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

continuously displaying the locking complete information at the position of the aiming point in the locking area, when a view-angle range of the second virtual object comprises a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in a locking area of another first virtual object.

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

controlling the second virtual object to continuously perform automatic shooting, when a view-angle range of the second virtual object comprises a plurality of first virtual objects, one first virtual object is in an eliminated state or a seriously injured state, and the aiming point is located in an under-attack area of another first virtual object.

15. The method according to claim 1, wherein before the controlling automatic shooting of the second virtual object, the method further comprises:

obtaining the under-attack area of the first virtual object according to a distance between the first virtual object and the second virtual object, a size of the under-attack area being positively correlated with the distance; and

the obtaining a locking area of a first virtual object comprises:

obtaining the locking area of the first virtual object according to the distance between the first virtual object and the second virtual object, a size of the locking area being positively correlated with the distance.

16. The method according to claim 15, wherein the obtaining the under-attack area of the first virtual object according to a distance between the first virtual object and the second virtual object comprises:

obtaining a target size of the under-attack area according to the distance between the first virtual object and the second virtual object; and

obtaining an area with the first virtual object being a center and a size being the target size as the under-attack area of the first virtual object.

17. An apparatus for controlling shooting of a virtual object, disposed in an electronic device, the apparatus comprising:

an obtaining module, configured to obtain a locking area of a first virtual object; wherein the locking area is an area range around the first virtual object and used for triggering automatic shooting, when an aiming point of a second virtual object is in the locking area, the second virtual object enters a preparation state for determining whether to perform automatic shooting on the first virtual object;

a display module, configured to display, when ~~an~~ the aiming point of ~~a~~ the second virtual object remains in the locking area for a target duration, locking complete information at a position of the aiming point in the locking area, the locking complete information indicating that locking of the first virtual object is completed; and

a control module, configured to control automatic shooting of the second virtual object on the first virtual object in response to the locking of the first virtual object is completed and the aiming point is located in an under-attack area of the first virtual object, ~~when the aiming point is located in an under-attack area of the first virtual object,~~ a size of the under-attack area being less than a size of the locking area.

18. The apparatus according to claim 17, wherein the display module is configured to:

start timing, when the aiming point of the second virtual object is located in the locking area; and

display the locking complete information at the position of the aiming point in the locking area,

when the timing reaches the target duration.

19. An electronic device, comprising one or more processors and one or more memories, the one or more memories storing at least one computer-readable instruction, the computer-readable instruction being loaded and executed by the one or more processors to implement the operations performed in the method for controlling shooting of a virtual object according to any one of claims 1 to 16.

20. One or more computer-readable storage media, storing at least one computer-readable instruction, the computer-readable instruction being loaded and executed by a processor to implement the operations performed in the method for controlling shooting of a virtual object according to any one of claims 1 to 16.