VIRTUAL ARCHERY DEVICE

FIELD OF THE INVENTION

This invention relates to a computer controlled virtual archery device based on the actual bow and arrow aimed at a specified target and claims priority from Singapore Patent Application No. 200718741-2. The setup for the virtual archery device involves a modified bow and arrow hardware, and the path taken by the arrow after the shooting and the target aimed are virtual in nature. Once the bow string is pulled and then released for shooting at the desired target, a virtual environment is entered as wireless electronic signals are transmitted to a receiving module which is connected to a standard computer monitor, liquid crystal display or other compatible display devices on which the virtual landing area of the virtual arrow on the target is projected.

BACKGROUND OF THE INVENTION

The bow and arrow is an ancient weapon used in traditional hunting of wild animals by traditional societies. The bow has the capability of shooting out arrows towards the target powered by the elasticity of the bow string is released upon actuation. Energy that has been stored in the arms of the bow is transformed into rapid motion when the bow string is released upon actuation, with the bow string transferring the kinetic energy to the arrow that has been released from the tensioned string. In ancient historical times, the bow and arrow was also been commonly used as a weapon during wars.

Although the bow and arrow has hardly been used as a weapon during wars and in hunting of wild animals in the modern era, archery, which is the art or skill of shooting using the bow and arrow, has developed into a popular professional sport (target shooting) that requires precision of the archer.

At another level, archery has also developed into a popular sport game around the world, entertaining both adults and children of diverse

backgrounds.

In recent times, with the proliferation of digital technology, archery as a sport game has taken yet another platform by making its entry into the virtual environment. This directly transformed archery into a safe and popular sport game.

In the scenario of the present invention, for example, the arrow, which can cause injury if mishandled, does not physically leave the bow after the bow string has been released upon actuation for shooting of the arrow towards the desired target. The path supposedly to be taken by the arrow following the release of the bow string is simulated through the transmission of signals to a receiver module which is connected to a standard computer monitor, liquid crystal display or other compatible display devices to which the virtual landing target has been projected on. A virtual sport game environment is therefore created.

It is an object of this invention to create a virtual game of archery which harnessed upon the skill and precision of the archer towards aiming at a virtual target. At the same time, a safe virtual sport game is created as no actual sharp weapons, in this case, the arrows, are used in the process, thus eliminating the possibility of accidental injury. While making it a sport game that is challenging, entertaining and fun, at the same time, it create an archery virtual game environment that is safe, even for children, without adult supervision.

Prior Art

US patent Application No. 2004 0014010 filed on 22 January 2004 in the name of Swensen, Frederick E. et al, describes a laser training system and method of simulating weapon. The invention features an archery bow with a laser transmitter which attaches to an arrow emulator secured to a bow to emit a laser pulse in response to actuation of the bow. A mounting device is used to secure the transmitter to the bow. The present invention is distinguished from prior art in that there is no direct transmission of

laser pulse onto the target area in order to compute the flight path of the arrow. The flight path of this invention is computed based on strength of the release of the bow string which is captured by the sensor attached to the arms of the bow which sends the data to the transmitter, after which wireless electronic signals, instead of laser pulse, are transmitted to a receiver module for computation of the flight of the virtual arrow, before showing the virtual target hit on a display device. While the prior art includes a method of detecting energy wave upon actuation of bow, the method involves is not identical to that of the present invention. It has been noted that the prior art makes use of rod 58 which is propelled into piston 56, therefore involves some form of specialized arrow. The present invention similarly makes use of a specialized arrow. However, the specialized arrow is different in the sense that in addition to it being retractable, it is also attached to a sensor, which is secured to a standard bow for transmitting wireless electronic signals. The virtual flight path of the arrow of this invention is computed based on strength of the release of the bow upon actuation, which is captured by the sensors, after which digital data is sent to the transmitter for transmission of wireless electronic signals to a receiver module for computation of the virtual flight path.

Summary of Invention

This invention relates to computer controlled virtual archery device based on an actual bow and arrow setup aimed at a virtual target. It involves a modified version of the traditional bow and arrow set, supplemented with specially programmed software for simulating the flight of an arrow and its landing on the virtual target. While the virtual archery device setup involved a modified version of the bow and arrow set, the path taken by the arrow after the actuation of the bow string and its landing on the target exist in the virtual environment. Once the bow string is actuated by pulling and then releasing of the bow string, sensors near the end of the arms bow are activated and the bow and arrow set enters the virtual environment as the wireless electronic signals are subsequently

transmitted to a receiver module which is connected to a standard computer monitor, liquid crystal display or other compatible display devices to which the virtual landing area of the virtual arrow on the target is projected. The landing of the virtual arrow on a virtual target is displayed on the display unit while the arrow, on the other hand, remains intact with the bow after the release of the bow string upon actuation. At this point, it takes a rest position.

DISCLOSURE OF INVENTION

The present invention seeks to provide a computer controlled virtual archery device based on the actual bow and arrow set used for shooting at a target.

The invention comprised both the hardware and the software setup, the said setups include :-

a bow and arrow set that would include a standard bow with a specialized arrow attachment that can transmit wireless electronic signals to a receiving module wherein

the bow can take the form of a specialized bow

- having a hardware setup comprising of a bow string attached to the specialized bow and the bow string having a stringed loop attached to it at midway to facilitate actuation of the bow string;
- having a hardware setup which alternatively comprises of a retractable string unit attached at midway to the bow string to facilitate actuation of the bow string, wherein the archer will use two of his fingers to pull on this device through the use of the finger grip to pull out the string from the spring loaded unit;
- having a software setup including electronic sensor devices located near the end of the two arms of the bow;

the sensors having the capacity to detect the tension of the bow string or the location of the tension;

the sensors having the capacity to measure the force upon actuation of the bow string after the target has been aimed;

- having one or a plurality of shock absorbers along the arms of the bow, the shock absorbers taking the form of a spring plate attached to both the top and bottom end of the bow;
- having one or a plurality of transmitters that transmit the signals detected by the sensors to the receiving module which is connected to a standard computer monitor, liquid crystal display or other compatible display devices on to which the target is projected;

the specialized arrow attachment, wherein

- the specialized arrow attachment having an arrow, arrow feather and arrow tail end;
- the specialized arrow attachment having a retractable arrow shaft which provides for the arrow to be retractable depending on the preference of the archer;
- the specialized arrow attachment having a retractable arrow shaft which can also function to house the retractable arrow together with the possibility of housing the transmitter unit and the connection point for other sensors;
- the specialized arrow attachment having a special grip handle to hook on to the bow string when ready to start the aiming and actuating sequence;
- the specialized arrow attachment is at a rest position when the bow string is at a rest position, that is when it is perpendicular to the arrow shaft.

a receiving module wherein

- the receiving module has been preprogrammed to receive data in the form of wireless electronic signals from the transmitter which has been attached to the bow;
- the digital data received by the receiving module will then be translated and computed to reflect the precise location of the virtual arrow on the virtual target and the path taken by the arrow simulated through virtual signals once the bow string has been actuated.

a standard display unit such as liquid crystal display panel or other compatible display devices onto which the virtual landing area of the virtual arrow on the target is projected.

The combined hardware and software setup allows the archer two options in using the specialized arrow to release the bow string during actuation:-

(1) the bow string can be released after pulling it independent of the specialized arrow.

(2) the bow string can be released after pulling it simultaneously with the specialized arrow. Both actions will trigger the same impact on the sensors located near the ends of the arms of the specialized bow.

When pulling the bow string independent of the specialized arrow, the use of an appropriate finger protection device which is designed for the unit is desirable.

A special string loop is also specially designed to facilitate the pulling and the releasing of the bow string which can be used in both options.

In an alternative embodiment, a retractable string unit can be utilized in place of the spring loop, wherein the archer will use two of his fingers to pull out the string from this spring loaded unit. In order to actuate the release of the bow string, the archer simply releases his fingers and the spring will recoil thus pulling back the string into the unit.

The specialized arrow can be retractable to the full extent in relation to the bow depending on the archer's preference while shooting at the aimed target.

In the third option, which is the preferred embodiment, the specialized bow and a specialized finger grip holder and sliding finger grip holder are proposed. The specialized retractable arrow rests on the sliding finger grip holder. At the end of the sliding finger grip holder towards the archer, is the finger grip holder. The bow string is tensioned pulled for actuation together with the use of the specialized finer grip holder, on which rests the specialized retractable arrow. The bow string and specialized sliding finger grip holder and specialized retractable arrow is pulled back when the specialized retractable arrow is drawn, by the use of the specialized sliding finger grip. When the bow string has been released, the specialized retractable arrow moves forward, along the sliding finger grip holder. After release, the specialized sliding finger grip and sliding finger grip holder comes back to its initial rest position.

In shooting the arrow, the archer will aim at the virtual area of the virtual landing target which has been projected onto the display unit. He may use either one of the two options given above to release the bow string for shooting. When the archer is ready to actuate the bow string, he will release a lever on the handle of the specialized arrow unit, releasing the bow string, thus activating the sensors. When he is releasing the bow string independent of the specialized arrow, he will release the string loop attached at midway to the bow string or make use of the retractable

string unit.

The action as described in the foregoing three options will virtually simulate the exact path taken by the specialized arrow in relation to the projected area of the virtual landing target.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, its advantages, and the objects attained by its usage, reference should now be made to the accompanying drawings. The virtual archery device referred to in the drawings can be manipulated for use in several ways, depending on the archer's preference.

The accompanying drawings therefore illustrate one or more embodiments of the invention and together with the description mentioned herein, serve to explain the workings and principles of the virtual archery device.

FIG. 1 is an illustration of the full setup of the virtual archery device inclusive of the specialized bow (1), the specialized retractable arrow (3), the receiving module (20) and the display unit (18) showing the virtual target (18a).

FIG. 2a is an illustration of the various parts of the specialized bow (1) and specialized retractable arrow (3) at the rest position.

FIG. 2b is an illustration of the various parts of the specialized bow (1) and specialized retractable arrow (3) at the rest position with the various parts, detached for clarity in the visualization of the various parts of the bow and arrow system.

FIG. 3a shows the various parts of the specialized bow (1) and the specialized retractable arrow (3) system, when the bow string (2) has been tensioned pulled for actuation together with the use of the

specialized retractable arrow (3) by the use of the hand grip unit.

FIG. 3b is a blown-up view of the portion indicated in FIG. 3a.

FIG. 4a shows the various parts of the specialized bow (1) and the specialized retractable arrow (3) attachment, when the bow string (2) has been tensioned pulled for actuation together with the use of the specialized retractable arrow (3) by the use of the retractable bow string unit (22).

FIG. 4b is a blown-up view of the portion indicated in FIG. 4a.

FIG. 4c is a detailed interior view the bow string unit (22) containing a spring coil (25) housed in a drum (26) which allows the winding of the string as shown in (27).

FIG 5a is a detailed view of the specialized bow (1) and a specialized sliding finger grip holder, in a rest position. The specialized sliding finger grip is at its initial rest position.

FIG 5b is a detailed view of the specialized bow (1) and a specialized sliding finger grip holder, when the bow string (2) has been tensioned pulled for actuation together with the use of the specialized retractable retractable arrow (3). The bow string and specialized sliding finger grip holder and specialized retractable arrow is pulled back when the specialized retractable arrow is drawn, by the use of the specialized sliding finger grip.

FIG 5c is a detailed view of the specialized bow (1) and a specialized sliding finger grip holder, when the bow string (2) has been released and the specialized retractable arrow (3) moves along the sliding finger grip holder. The specialized sliding finger grip and sliding finger grip holder then comes back to its initial rest position.

BEST MODES FOR CARRYING OUT THE INVENTION

A description of the main and other embodiments of the present invention are given below with reference to the drawings.

In Figure 1, the full setup of the virtual archery device comprising both the hardware setup and the software setup of the invention is shown. It includes a specialized bow (1) with a specialized retractable arrow (3) attachment, a receiving module (20) and a standard computer monitor, a liquid crystal display screen or other compatible display units (18) onto which the virtual landing area of the virtual arrow on the target (18a) is projected. To complete the setup, the receiving module (20) is attached to the display unit (18) by means of a cable attachment (19).

The software setup includes electronic sensors (15) which are fixed near the end of the arms of the specialized bow and one or a plurality of digital data transmitters (14), which are mounted to the arms of specialized bow (1), preferably at midway. The path taken by the virtual wireless electronic signal (21) is digitally transmitted after the bow string is released upon actuation. The position of the virtual landing target (18a) is also illustrated in Figure 1. The receiving unit (20) has also been programmed to allow it to be capable of reading and playing third party software which can be used in place of the software which have been specially written for use with the current invention.

FIG. 2a is an illustration of the various parts of the specialized bow (1) and specialized retractable arrow (3) at the rest position.

FIG. 2b is an illustration of the various parts of the specialized bow (1) and specialized retractable arrow (3) at the rest position with the various parts detached for clarity in the visualization of the various parts of the bow and arrow set.

The archer has three options in relation to the virtual release of the specialized retractable arrow (3) upon actuation of the bow string after aiming at the desired virtual landing target (18):-

(1) He can make use of the string loop. In this instance, he actuates the bow string (2) by pulling the string loop (10) in Figure 2 and releasing it independent of the specialized retractable arrow (3). Upon actuation, the sensors (15) located near to the two ends of the bow (1) will be activated, after which digital data will be sent to the transmitter unit (14) which will then send wireless electronic signals (21) to the receiving module (20) to compute the exact position of the virtual arrow that had landed on the virtual target (18a) and reflecting the same on the display unit (18) connected to it.

(2) The bow string (2) can be released after pulling it simultaneously with the specialized retractable arrow (2). This position is illustrated in Figure 3a. The specialized retractable arrow can be drawn to the full extent of the bow according to the archer's shooting preference and released by means of trigger release (8) to release the string hook (7) which will then release arrow tail end clip (17), which will then release the bow string (2). This is shown in the blown up view of Figure 3b. Once the trigger release (8) is activated, the string hook (7) will release the bow string (2), and the sensors (15) located at the two ends of the bow will be activated, after which digital data will be sent to the transmitter unit (14) which will then sent wireless electronic signals (21) to the receiving module (20) to compute the exact position of the virtual arrow that had landed on the virtual target (18a) and reflecting the same on the display unit (18) connected to it. When applying the foregoing method, the use of an appropriate wrist guard (9) which is designed for the invention is desirable.

(3) The archer can draw the specialized retractable arrow by sliding the specialized arrow by drawing a slidable finger grip. The slidable finger grip rests on a finger grip holder. As the slidable finger grip is drawn towards the archer, the specialized arrow is drawn towards the archer. Once the slidable finger grip is fully drawn, and the archer releases the finger grip, the slidable finger grip and finger grip holder will be released to return to its initial rest position. At the release of the finger grip, and consequently the specialized retractable arrow, digital data will be sent to the transmitter unit (14) which will then sent wireless electronic signals (21) to the receiving module (20) to compute the exact position of the virtual arrow that had landed on the virtual target (18a) and reflecting the same on the display unit (18) connected to it.

The string loop (10) has also been specially designed to cater for the second option. In such an instance, the string loop (10), which is attached to the bow string (2) can be pulled to add tension to the bow string (2) and then released to actuate the bow string (2) for shooting at the aimed target (18a).

In an alternative embodiment shown in Figure 4a, the string loop can be replaced with a retractable bow string unit (22) attached at midway to the bow string (2) to facilitate actuation of the bow string (2), wherein the archer will use two of his fingers to pull on this device through the use of the finger grip (23) to pull out the string from the spring loaded unit. Figure 4b and 4c show the details of the retractable bow string unit (22). The string from the retractable bow string unit (22), which was spring coiled (25) and housed within the drum (26), can be drawn in two directions, one secured to the top of the bow (2a), the other secured to the bottom of the bow (2b). At rest position, the string is vertical with the unit at the middle of the string, as the spring is keeping the tension, pulling on both strings. When the archer has taken aim at the target and

is ready, the archer simply release his fingers from the finger grip (23) and the spring will recoil thus pulling back the string into the unit. The triggering of the virtual arrow remains the same as described before.

Two or a plurality of shock absorbers (16) are mounted along the arms of the standard bow to cushion the impact of the shock and vibrations generated by the bow upon the release of the bow string (2) during actuation, thus providing a more accurate measurement of the force from the released bow string (countering the effect of the forces generated from the reverberations of the string). Computation of the virtual path of the arrow will thus be more accurate and largely based on the force from the released bow string.

In all options, the archer will aim the specialized retractable arrow (3) at the virtual landing area of the target (18a) which is projected onto the display unit (18).

When the archer is ready to shoot at the aimed virtual landing area of the target, he either release the special string loop (10) attached to the bow string (2) or activate the trigger release (8). Once the bow string (2) is pulled and then released, the flight of the arrow of the virtual archery device enters the virtual environment. The sensors (15) would measure the force of the release of the bow string (2), converting the measurement into the wireless electronic signals (21) which would then be transmitted to a receiver module (20) via a transmitter (14). The software of the virtual archery device includes algorithm for computation and simulation of the virtual path of the specialized retractable arrow (3) in relation to the projected virtual landing target (18a).

The receiving module (20) is connected by a cable (19) to a standard computer monitor, liquid crystal display liquid crystal display or other compatible display units (18) on which the virtual landing target (18a) for the specialized arrow (3) is projected. The virtual target (18a) is "hit" thereon while the specialized arrow (3), on the other hand, remains intact

with the standard bow (1) after the shooting, returning to a rest position, if it had been retracted during the actuation process.

The preferred embodiment is shown in Figure 5a. A sliding finger grip holder and finger grip is attached at midway to the bow (1) to facilitate actuation of the bow string (2). At the end of the finger grip holder is a sliding finger grip, wherein the archer will use two of his fingers to pull on the sliding finger grip to draw the specialized arrow back. At initial rest position, the specialized arrow rests onto the sliding finger grip holder. When the archer pulls the sliding finger grip, the archer will draw out the bow string.

Figure 5b show the details of the sliding finger grip sliding outwards towards the archer as the bow strings are pulled to draw the arrow. As the retractable specialized arrow is drawn towards the archer, resting on the finger grip holder, the sliding finger grip is pulled towards the archer. The sliding finger grip is pulled until the arrow is fully drawn, all the time resting on the sliding finger grip holder.

The archer then releases the sliding finger grip. The specialized retractable arrow is then released and slides along the finger grip holder. In the meanwhile, the bow string comes back to its initial rest position, as shown in Fig. 5c. After the specialized retractable arrow is released, the sliding finger grip and finger grip holder slides back to its original rest position. The release of the virtual arrow results in the transmission of wireless electronic signals from the transmitter to the receiving module. The digital data received by the receiving module will be translated and computed to reflect the precise location of the virtual arrow on the virtual path, as described earlier in respect of the other embodiments and would not be repeated here.

It is envisaged that similar devices could be used for the same purposes as intended with or without modifications for the invention to work in such a scenario.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the claims.

CLAIMS

1. A virtual archery device comprising both a hardware and a software set up, the set up comprising

    a bow and arrow set;

    a receiving module; and

    a display unit

    wherein the bow and arrow set would include a standard bow with a specialized arrow attachment that can transmit wireless signals to a receiving module to simulate the flight of the arrow and landing of the arrow on the target and displaying the landing of the arrow on the target on a display unit.

2. The standard bow and arrow set as claimed in Claim 1 taking the form of a specialized bow and arrow set, comprising a bow string and a slidable finger grip holder and a slidable finger grip at the end of the finger grip holder, wherein the arrow rests on the slidable finger grip holder, and the finger grip holder is slidable along the finger grip holder.

3. The specialized bow and arrow set as claimed in Claim 2 where at the initial set up, the arrow rests on the slidable finger grip holder, and when the bow is drawn, the arrow and finger grip holder is pulled towards an archer, by using the finger grip.

4. The specialized bow and arrow set as claimed in Claim 2 where the archer releases his fingers on the slidable finger grip, the arrow will slide forward along the slidable finger grip holder, until the bow returns to its initial set up position, and the slidable finger grip holder and the slidable finger grip holder returns too to its

initial set up position.

5. The standard bow as claimed in Claim 1 taking the form of a specialized bow having a hardware setup comprising of a bow string attached to the specialized bow and the bow string having a string loop attached to it at midway for actuation of the bow string upon release.

6. The standard bow as claimed in Claim 1 taking the form of a specialized bow having a hardware setup comprising a retractable bow string unit attached at midway to the bow string to facilitate actuation of the bow string, wherein the archer will use two of his fingers to pull on this device through the use of the finger grip to pull out the string from the spring loaded unit;

7. The specialized bow as claimed in Claim 5 or 6 having sensor devices capable of detecting and measuring the tension of the bow string or the location of the tension.

8. The specialized bow as claimed in Claim 5 or 6 having a software setup including electronic sensor devices located at the end of the two arms of the bow.

9. The specialized bow as claimed in Claim 5 or 6, having sensors which has the capacity to capture the force upon actuation of the bow string after the target has been aimed.

10. The specialized bow as claimed in Claim 5 or 6, having one or a plurality of shock absorbers along the arms of the bow, the shock absorbers taking the form of a spring plate attached to both the top and bottom end of the bow.

11. The specialized bow as claimed in Claim 5 or 6 having one or a plurality of transmitters that transmit the signals detected by the sensors to the receiving module which is connected to a standard computer monitor, liquid crystal display or other compatible display devices on to which the target is projected.

12. The specialized arrow attachment as claimed in Claim 1, comprising a specialized arrow and retractable arrow shaft, wherein the specialized arrow is retractable, and the retractable arrow shaft provides for the arrow to be retractable depending on the preference of the archer.

13. The specialized arrow attachment as claim in Claim 12 having a retractable arrow shaft which can also function to house the retractable arrow unit together with the possibility of housing the transmitter unit and the connection point for other sensors;

14. The specialized arrow attachment as claimed in Claim 12 having a special grip handle to hook on to the bow string when ready to start the aiming and actuating sequence.

15. The specialized arrow attachment as claimed in Claim 12 having an arrow head, arrow feather and arrow tail end.

16. The specialized arrow attachment as claimed in Claim 13 wherein the specialized arrow is at a rest position when the bow string is at a rest position, that is when it is perpendicular to the specialized arrow attachment.

17. A receiving module for a virtual archery device in Claim 1 wherein the receiving module has been preprogrammed to receive data in the form of wireless electronic signals from the transmitter attached to the bow.

18. A receiving module in Claim 17 wherein the digital data received by the receiving module will then be translated and computed to reflect the precise location on the virtual landing target of the arrow, of which, the path taken by the arrow was simulated through wireless electronic signals once the bow string has been actuated.

19. A virtual archery device as claimed in any one of Claims 1 to 19 having software which includes algorithms that would compute and simulate the virtual path of the specialized arrow in relation to the projected virtual landing target.