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(54) LASER ELECTRONIC TARGET SYSTEM USING NON-OVERLAPPING AND CROSSING RECTANGULAR LASER SCREENS

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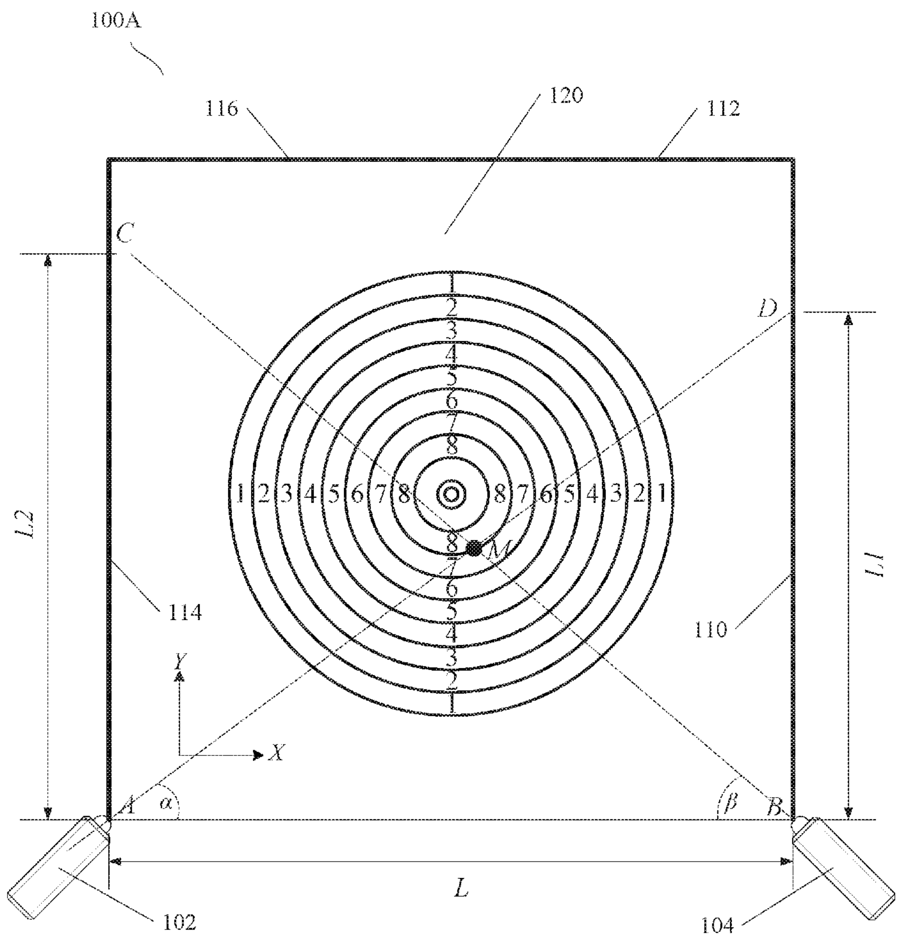
(57) **ABSTRACT**

A laser electronic target system is disclosed herein, comprising a bullet trap and a first and second rectangular laser screens generated in front of the bullet trap, wherein each of the first and second rectangular laser screens is generated by a detachable laser transmitter and a laser receiver comprising a first sensor strip and a second sensor strip, wherein a first end of the first sensor strip is perpendicularly connected to a second end of the second sensor strip, wherein each sensor strip comprises 100 to 150 laser sensors, and wherein the laser transmitter and the first and second sensor strips are on a same plane. The disclosed system uses a method to determine positions of target-hit points using a laser array and angles, which can increase efficiency, reduce cost, and avoid interferences from other electromagnetic or ultrasonic sources, thus being suitable for shooting training and matches.



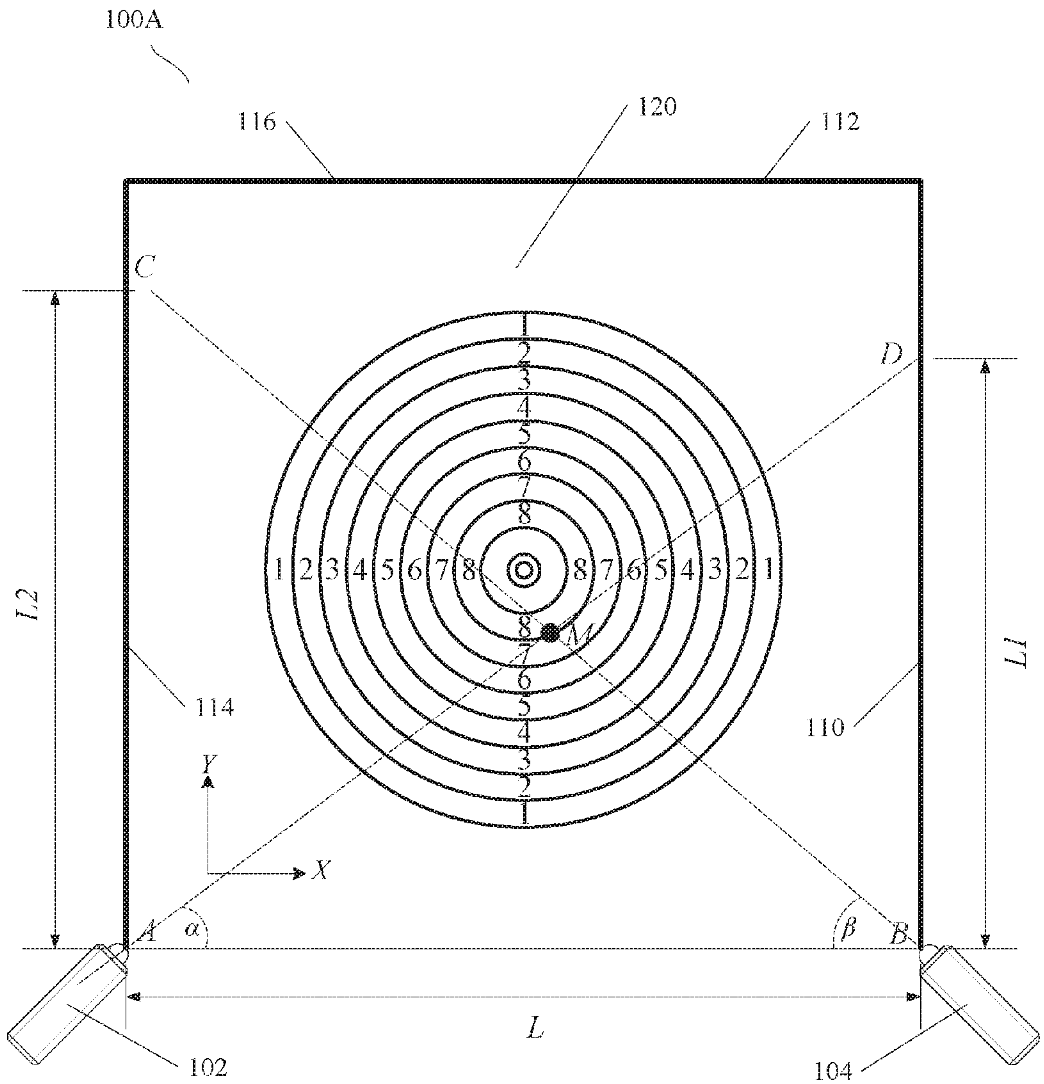

100A
116
120
112
C
D
L2
L1
1
2
3
4
5
6
7
8
1 2 3 4 5 6 7 8
8 7 6 5 4 3 2 1
M
114
110
Y
X
A
α
β
B
L
102
104

FIG. 1A

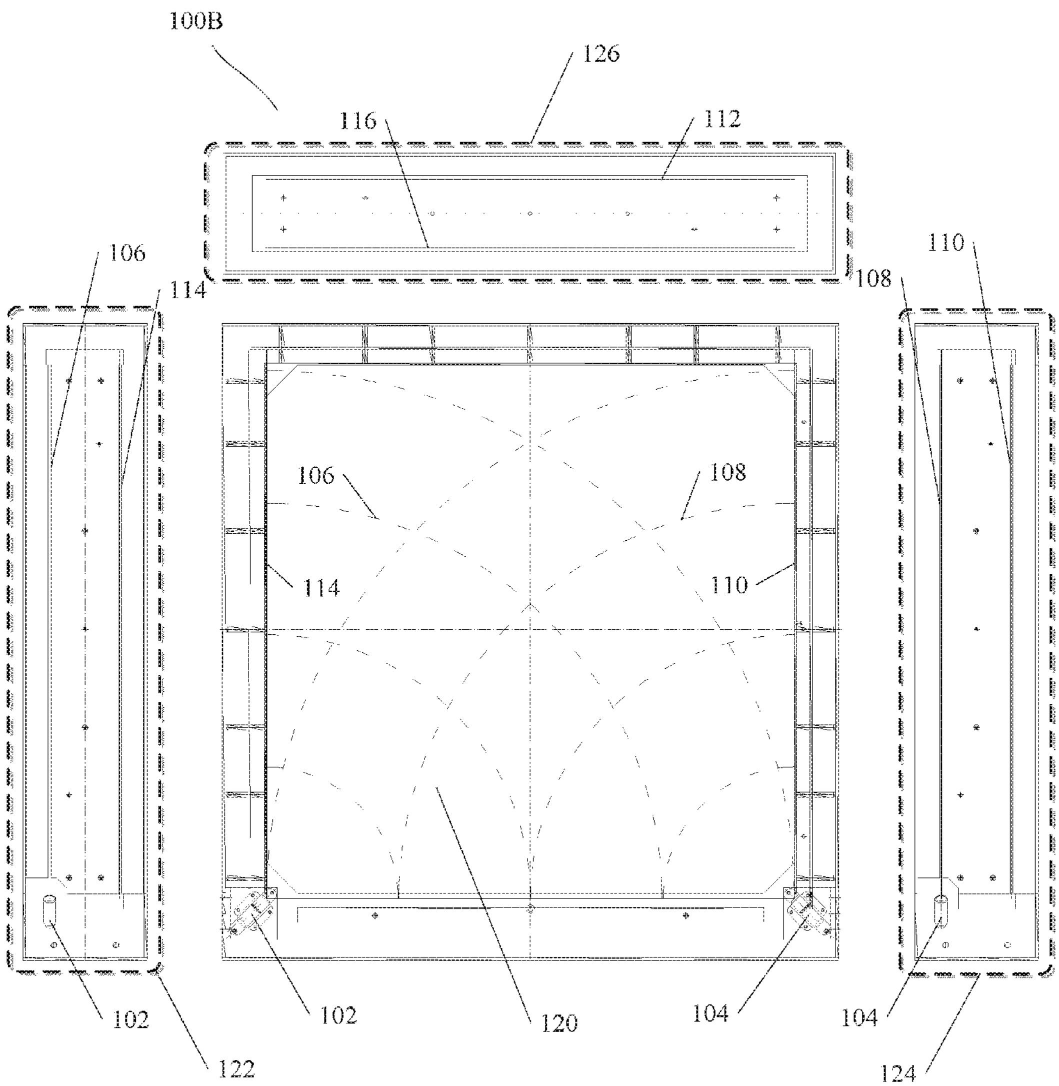

100B
126
116
112
106
114
110
108
106
108
114
110
102
102
120
104
104
122
124

FIG. 1B

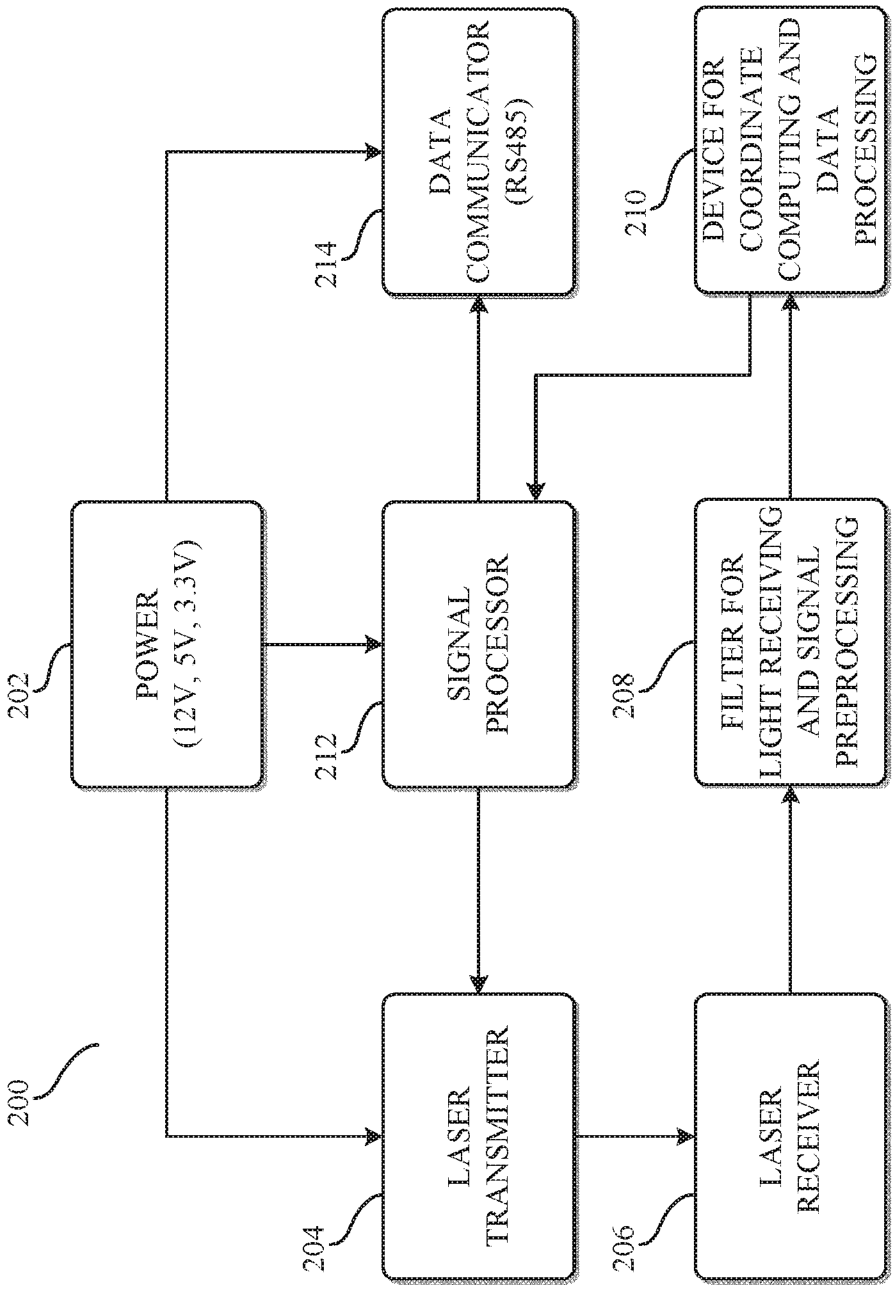

200
202
POWER (12V, 5V, 3.3V)
204
LASER TRANSMITTER
206
LASER RECEIVER
208
FILTER FOR LIGHT RECEIVING AND SIGNAL PREPROCESSING
210
DEVICE FOR COORDINATE COMPUTING AND DATA PROCESSING
212
SIGNAL PROCESSOR
214
DATA COMMUNICATOR (RS485)

FIG. 2

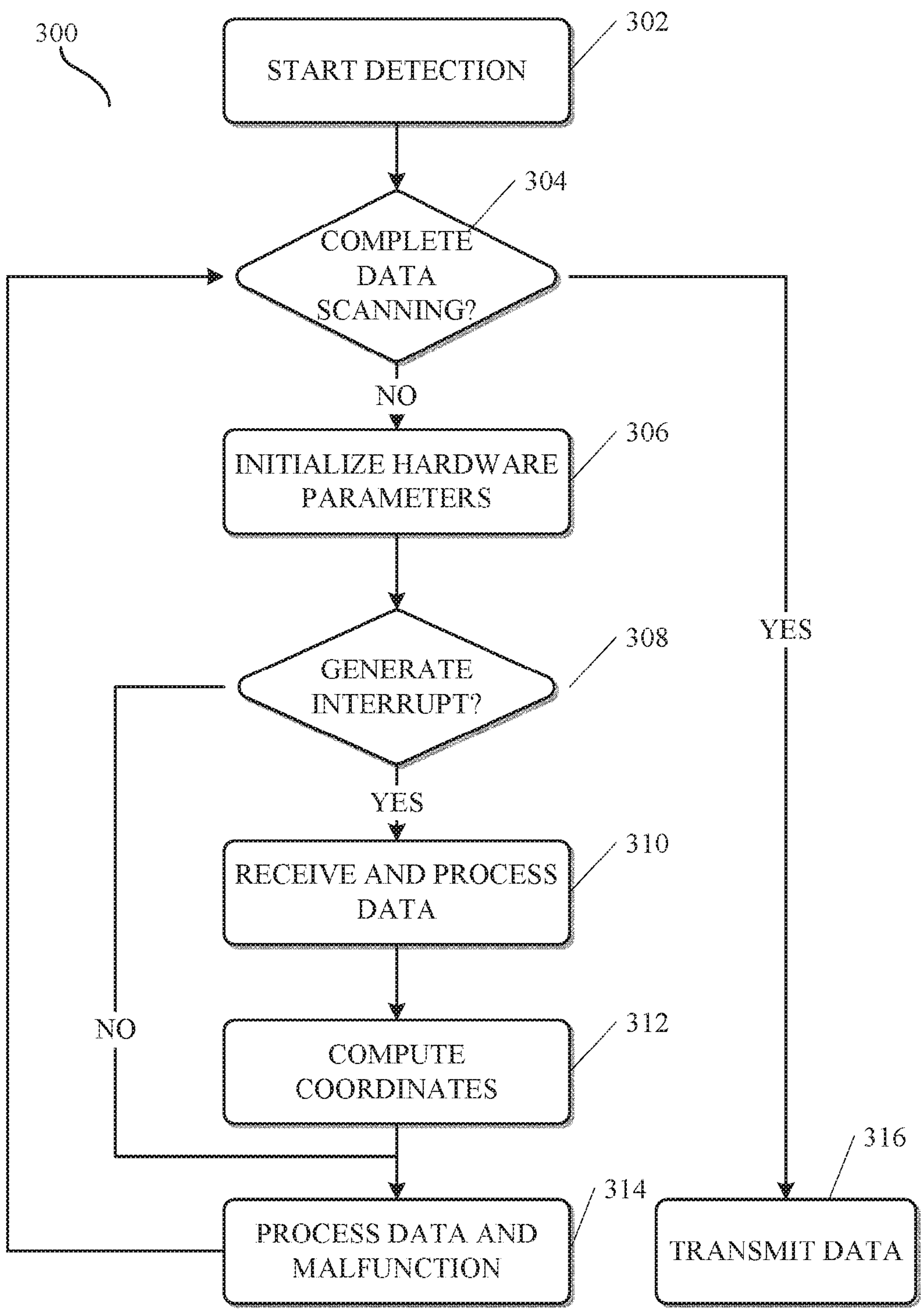

300
START DETECTION
302
COMPLETE DATA SCANNING?
304
NO
YES
INITIALIZE HARDWARE PARAMETERS
306
GENERATE INTERRUPT?
308
YES
NO
RECEIVE AND PROCESS DATA
310
COMPUTE COORDINATES
312
PROCESS DATA AND MALFUNCTION
314
TRANSMIT DATA
316

FIG. 3

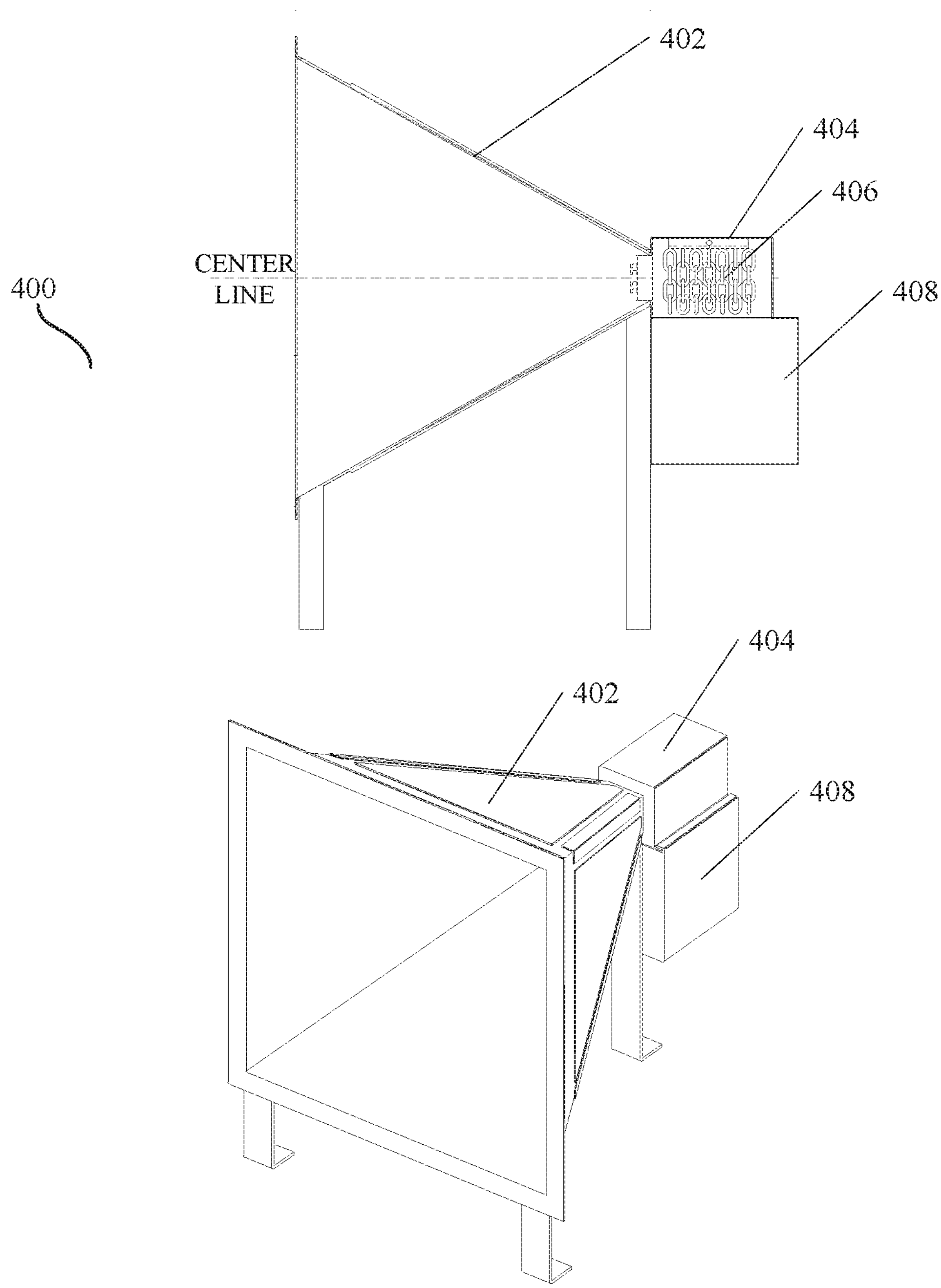


FIG. 4

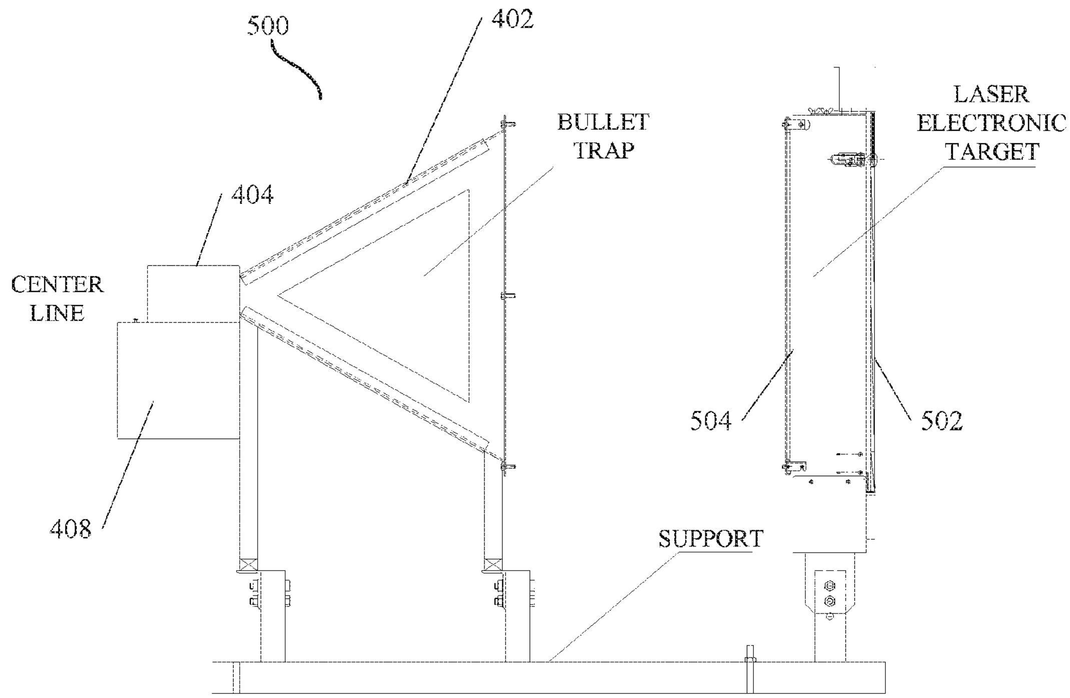

500
402
BULLET
TRAP
LASER
ELECTRONIC
TARGET
404
CENTER
LINE
504
502
408
SUPPORT

FIG. 5

LASER ELECTRONIC TARGET SYSTEM USING NON-OVERLAPPING AND CROSSING RECTANGULAR LASER SCREENS

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Chinese patent application no. CN 201510490545.X, filed on Aug. 11,2015, and Chinese patent application no. CN 201520602963.9, filed on Aug. 11, 2015, the contents of which are incorporated in this disclosure in their entireties by reference.

TECHNICAL FIELD

[0002] The present disclosure relates generally to an electronic device for sports shooting.

BACKGROUND

[0003] In shooting training and events, electronic target systems that can be used include double-electrode short-circuit sampling systems, semiconductor electronic target systems, image processing based target systems, ultrasonic positioning electronic target systems, and laser electronic target systems, for example.

[0004] Laser electronic target systems are suitable for shooting events because they mainly consume electric power, have high detection precision for target hit due to digitized signals, and require little maintenance. When compared to other electronic targeting devices, laser electronic target systems can have the highest detection precision for target hits, use no disposable target supplies, and satisfy the requirement of detection precision for target hits and efficiency.

SUMMARY

[0005] Disclosed herein is a laser electronic target system using non-overlapping and crossing rectangular laser screens, comprising a bullet trap and a first and second rectangular laser screens generated in front of the bullet trap, wherein each of the first and second rectangular laser screens is generated by a detachable laser transmitter and a laser receiver comprising a first sensor strip and a second sensor strip, wherein a first end of the first sensor strip is perpendicularly connected to a second end of the second sensor strip, wherein each sensor strip comprises 100 to 150 laser sensors, and wherein the laser transmitter and the first and second sensor strips are on a same plane.

[0006] In another aspect, a laser electronic targeting device is disclosed herein, comprising a casing, a controller, a first laser transmitter in communication with the controller and coupled to the casing, the first laser transmitter emitting a first laser defining a first plane, a second laser transmitter in communication with the controller and coupled to the casing in a position different from the first laser transmitter, the second laser transmitter emitting a second laser defining a second plane different from the first plane, wherein the second laser transmitter is displaced from the first laser transmitter such that the second plane defined by the second laser is parallel to the first plane defined by the first laser, a first laser receiver in communication with the controller and coupled to the casing, the first laser receiver being capable of receiving the first laser emitted by the first laser transmitter, and a second laser receiver in communication with the controller and coupled to the casing, the second laser receiver capable of receiving the second laser emitted by the second laser transmitter.

[0007] In another aspect, a laser electronic target system is disclosed herein, comprising a bullet trap and a plurality of laser screens generated in front of the bullet trap, wherein each of the plurality of laser screens is respectively in a plane mutually parallel to other laser screens, wherein each of the plurality of laser screens is generated by a laser transmitter and a laser receiver, wherein the laser transmitter and the laser receiver are located on the plane that the laser screen resides in, and wherein each laser transmitter of the plurality of laser screens emits laser in a direction different from other laser transmitters.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The disclosure is best understood from the following detailed description when read in conjunction with the accompanying drawings.

[0009] FIG. **1**A is a diagram of a laser electronic target system using non-overlapping and crossing rectangular laser screens according to implementations of this disclosure.

[0010] FIG. **1**B is another diagram of a laser electronic target system using non-overlapping and crossing rectangular laser screens according to implementations of this disclosure.

[0011] FIG. **2** is a diagram of information processing of a laser electronic target system using non-overlapping and crossing rectangular laser screens according to implementations of this disclosure.

[0012] FIG. **3** is a flow chart of information processing of a laser electronic target system using non-overlapping and crossing rectangular laser screens according to implementations of this disclosure.

[0013] FIG. **4** is a structure diagram of a bullet trap of the laser electronic target system according to implementations of this disclosure.

[0014] FIG. **5** is a structure diagram of a laser electronic target system according to implementations of this disclosure.

DETAILED DESCRIPTION

[0015] Compared with other target systems, double-electrode short-circuit sampling systems have a lower detection rate of target-hits for scoring, and do not meet the standards of shooting training and matches. Semiconductor electronic target system have simple designs, require little maintenance, and have high detection precision for target hits, but usage of such systems is limited due to high cost. Image processing based systems provide simple functions and fair scoring results, but have low detection precision for target hits and a slow reaction, which is not suitable for real-time scoring.

[0016] Ultrasonic positioning electronic target systems are widely used in shooting events. The principle of ultrasonic positioning electronic target systems is that, when a bullet passes through the disposable target supplies (e.g., a PVC rubber blanket), analog ultrasonic information of target-hit points can be generated and obtained by ultrasonic sensors (e.g., ultrasonic probes) to determine the value of the hit ring. They can adapt to the ambient environment, tolerate complex environmental conditions such as darkness or electromagnetic interferences, and have a certain detection precision for target hits. However, they have several limitations. For example, position errors or deviations can be introduced to the ultrasonic probes during their installation or maintenance. For another example, before each shooting event, the positions of the ultrasonic probes need calibration according to the environment and their own measurement uncertainties, and their positions cannot be changed during use; otherwise, the values of the determined hit ring will be affected. For another example, ultrasonic positioning electronic target systems usually include moving components (e.g., a motor or a rubber blanket rewinder) which are prone to mechanical malfunctions, causing deviation of the values of the determined hit rings. For another example, the disposable target supplies (the rubber blanket) of the ultrasonic target system must maintain a certain level of tension verticality and horizontality; otherwise, the value of the hit ring will also be affected. Moreover, ultrasonic positioning electronic target systems consume large quantities of disposable target supplies, which need to be replaced after each use. The high purchasing cost of disposable target supplies limits the use of ultrasonic positioning electronic target systems, especially for ranges and facilities with low budgets.

[0017] Compared to ultrasonic positioning electronic target systems, laser electronic target systems do not use disposable target supplies, minimize moving components within the system, can use precision machining (e.g., by numerical control machines) for its optical transmitter and receiver to reduce positioning errors during installation, and can achieve high detection precision by using a method to determine positions of target-hit points using a laser array and angles.

[0018] Laser electronic target systems can have various implementations. For example, some systems can be based on laser beam arrays, in which multiple laser transmitters and receivers are placed in an alternating corresponding order and digital signals generated from a bullet passing through the laser beam arrays can be used to determine the position of a target-hit point.

[0019] According to implementations of this disclosure, a laser electronic target system using non-overlapping and crossing rectangular laser screens is disclosed herein. The disclosed laser electronic target system can use detachable/replaceable laser transmitters/modules, which can reduce maintenance and repair costs when the service lives of the laser transmitters are reached or exceeded.

[0020] For example, the disclosed laser electronic target system can include a bullet trap and two rectangular laser screens generated in front of the bullet trap. Each of the rectangular laser screens can be generated by, for example, a detachable laser transmitter (e.g., a line laser transmitter) and two sensor strips (including a first and a second sensor strip) as a laser receiver. As shown in FIGS. **1**A and **1**B, laser transmitter **102** and laser transmitter **104** can emit laser beams (e.g., line laser beams) **106** and **108**, respectively. Laser transmitters **102** and **104** can be displaced in two different positions in a direction perpendicular to the plane of target **120**, by which laser beams **106** and **108** can be in two non-overlapping (e.g., non-intersecting) parallel planes. As shown in FIG. **1**B, laser beam **106** can be received by a first laser receiver including laser sensor strips **110** and **112**, and laser beam **108** can be received by a second laser receiver including laser sensor strips **114** and **116**. In some implementations, for each laser receiver, a first end of the first sensor strip can be perpendicularly connected to a first end of the second sensor strip, and each sensor strip can include multiple laser sensors (e.g., 100 to 150 sensors per strip). In other implementations, the first end of the first sensor strip can be connected to the first end of the second sensor strip at an angle other than 90 degrees. For example, as shown in FIGS. **1**A and **1**B, sensor strips **110** and **112** can be connected at their ends, and sensor strips **114** and **116** can also be connected in a similar way. When a line laser is emitted from the laser transmitter and received at the laser receiver, a planar laser field/projection (a "laser screen" or a "laser curtain") can be formed or generated.

[0021] As shown in FIG. **1**B, target **120** can include side boards **122**, **124**, and **126**. In some implementations, the side boards **122**, **124**, and **126** can form the top and side surfaces of a rectangular casing or a rectangular frame as shown in FIG. **1**B. As shown in FIG. **1**B, laser transmitter **102**, sensor strip **106**, and sensor strip **114** are coupled to side board **122**, while laser transmitter **104**, sensor strip **108**, and sensor strip **110** are coupled to side board **124**. Similarly, sensor strip **112** and sensor strip **116** are coupled to side board **126**. For illustration purposes, each of the side boards **122**, **124**, and **126** is displayed in FIG. **1**B to be "flipped outward" from target **120** so that the laser receivers can be shown. As shown in FIG. **1**B, each of the side boards **122**, **124**, and **126** has a near-end edge with respect to target **120** that is illustrated to be "flipped inward" to the plane of target **120** and a far-end edge with respect to target **120** that is illustrated to be "flipped outward" from the plane of target **120**. The dashed lines along the long axes of side boards **122**, **124**, and **126** can represent the rotational axes of the aforementioned flipping. As can be seen from side boards **122** and **124**, emission points of laser transmitters **102** and **104** can be in different planes. In some implementations, an emission point of a laser transmitter and the two sensor strips receiving a laser beam emitted by the laser transmitter can be in a same plane. The plane shared by the emission point and the two sensor strips can be associated with a direction, which can be, for example, the emitting direction of the laser. For example, the emission point of laser transmitter **102** and the laser-receiving connected sensor strips **110** and **112** can be in a first plane, and the emission point of laser transmitter **104** and the laser-receiving connected sensor strips **114** and **116** can be in a second plane, in which laser beams **106** and **108** can form two non-overlapping and crossing (indicated by the crossing arcs with different emission directions in FIG. **1**B) rectangular laser screens.

[0022] In some implementations, each sensor strip can include 115 light sensing points (e.g., light sensors) and there can be a total of 230 light sensing points for a laser receiver having two perpendicular sensor strips. In some implementations, the target system can include at least two laser screens, where the laser screens are non-overlapping and associated with a laser emission direction. In such a system, a position on a plane can be determined as set forth in the following description.

[0023] Regarding design, this disclosure sets forth a concept of crossing rectangular laser screens. Due to the game rules of 25 m and 50 m shooting matches, laser targets can be limited in size. The size of the laser electronic targets as disclosed herein can be made relatively small, with the benefits of reducing costs and leaving the center spacing between targets unaffected. For example, if using technology of arc-shape laser screens, which, for example, can be used in 10 m shooting matches, the casing sizes of 25 m or 50 m targets can be relatively large, thus raising the costs and affecting the center spacing between targets.

[0024] In some implementations, two non-overlapping laser screens can be used to detect position data for target hits of bullets, and the laser transmitters can be detachable or replaceable line laser transmitters or modules. In some implementations, the sensor strips can form a rectangular frame in a plane perpendicular to a center line (the dashed line shown in FIG. **4** and FIG. **5**) of the bullet trap and the two line laser transmitters can be positioned on a same edge of the rectangular frame. As shown in FIGS. **1**A and **1**B, the laser transmitters **102** and **104** can be positioned at two vertices of a rectangle. In some implementations, spatial parameters of the laser transmitters can be adjusted, such as their angle or levelness. The first laser receiver can include a first sensor strip perpendicularly connected to a second sensor strip to form a first right-angle structure. The second laser receiver can include a first sensor strip perpendicularly connected to a second sensor strip to form a second right-angle structure. A first edge of the first right-angle structure can overlap a first edge of the second-right angle structure to form a rectangular shape as shown in FIGS. **1**A and **1**B. Each right-angle structure can correspond to one of the two laser transmitters and two ends of two laser receiving boards or strips can be connected via a connector or spliced in a right angle to form the right-angle structure. The laser receivers can be mounted in, for example, a rectangular casing. In the above example, a laser screen can be confined within the rectangular casing and thus be in a rectangular shape (a "rectangular laser screen").

[0025] In some implementations, the casing of the electronic target can have a volume approximate to the casing of an ultrasonic positioning electronic target. The shell of the casing can be made using laser cutting and splice welding, ensuring precise geometric properties such as perpendicularity and verticality.

[0026] When a bullet passes through a rectangular laser screen, a digital signal can be instantly generated at the two sensor strips (as a laser receiver), each sensor strip having 115 laser sensing points (e.g., laser sensors). The laser receiver of the rectangular laser screens can output signals of 0 and 1, in which the 0 and 1 can be used to represent whether an optical path is obstructed. The use of digital signals can reduce errors of numerical values compared to the use of analog signals.

[0027] For example, the laser receivers can be connected perpendicularly, and the time resolution of the laser receivers can be 10 ns. The "time resolution" herein refers to the minimum time interval that a sensor can discern between two different detected signals, such as between "0" and "1," "on" and "off," "voltage/current high" and "voltage/current low," "light blocked" and "light unblocked," or any other possible signals permitted by existing sensor technologies. For example, a 10 ns time resolution of a laser sensor means that, if any time interval of a laser beam changing from "unblocked" to "blocked," or vice versa, is less than 10 ns, the laser sensor cannot detect such changes. In the above example, the digital signals instantly generated at the rectangular laser screen can be used to calculate the position of the target-hit points. For a bullet passing through the laser screen with a high speed (e.g., 300-450 m/s), since the rectangular laser screen has a high response time (e.g., time resolution), the system can be used as a laser target in 25 m and 50 m shooting events. In addition, based on the time duration of a beam being blocked at one or more sensors, the system can also determine entry of insects or other objects moving at a slower speed into the laser screens. For another example, if the bullet has a speed of 500 m/s, a length of 5 mm, then the time duration of the bullet obstructing the optical path is 10 μs. In the above example, the system can adopt a data acquisition rate of, for example, 10M Hz (equivalent to acquiring data in every 0.1 μs), which meets the requirement for detecting bullets passing the laser beams with high speeds. By using at least two laser screens, position coordinates of the target-hit points can be determined.

[0028] In one example, with a minimum diameter of a bullet such as 5.6 mm and a target size of 540 mm×540 mm, the spacing of the sensors can be set as, for example, 1.8 mm, by which the position of every passing bullet can be detected and differentiated. Other dimensions for the target size or sensor spacing can be used.

[0029] In some implementations, the laser transmitters can have a power of 100 mW and emit visible line lasers at wavelength 650 nm. By using a fixed wavelength of the laser, the system can avoid interferences from other electromagnetic or ultrasonic sources. In some implementations, the emitted visible line laser can project in a triangle shape with a vertex angle (e.g., 120°) at the line laser transmitter and irradiate evenly to the laser sensors of the corresponding perpendicular sensor strips. In the above example, each of the sensor strips can include 115 laser sensors with 1.8 mm spacing, in which a time resolution for each laser sensor can be less than 10 ns. When bullets are passing the laser screens, they will leave momentary shadows in the sensors and are only detectable with a sufficiently high time resolution (e.g., response speed). The two visible line lasers emitted by the two line laser transmitters can respectively irradiate to the two laser receivers having perpendicular sensor strips and position coordinates of the target-hit points can be determined based on the momentary shadows left by the bullet passing the laser screens with a high speed. In some examples, the receivers can be arranged in a 90 degree angle toward each other. The implementations as disclosed herein can effectively detect any bullet of any material with a 1-50 mm diameter, suitable for detection of target hits of guns for shooting events, such as air pistols, air rifles, center-fire guns, or any type of guns for military or law enforcement.

[0030] In some implementations, the position coordinates of the target-hit points can be calculated as follows.

[0031] As shown in FIG. **1**, M is a bullet's hit point on target **120**, A and B are end points of sensor strip **114** and **110**, respectively. In triangle ABM, let ∠MAB=α, ∠MBA=β. In a right angle coordinate system with its origin at A, x-axis along the AB direction, and y-axis along the AC direction, the coordinates (X,Y) of M can be calculated as

$$\begin{cases} X = \dfrac{L \times \tan\beta}{\tan\alpha + \tan\beta} \\ Y = \dfrac{L \times \tan\alpha \times \tan\beta}{\tan\alpha + \tan\beta} \end{cases} \quad (1)$$

[0032] Let point C be the intersecting point of line BM with sensor strip **114**, point D be the intersecting point of line AM with sensor strip **110**, and AC=X2, BD=X1. Substituting tan

$$\alpha = \frac{L1}{L} \text{ and } \tan\beta = \frac{L2}{L}$$

in Equation (1), then

$$\begin{cases} X = \dfrac{L \times L2}{L1 + L2} \\ Y = \dfrac{L1 \times L2}{L1 + L2} \end{cases} \tag{2}$$

[0033] Based on locations of the shadows (points C and D) left by the bullet passing through the laser screens at point M detected by the sensor strips, the location of point M with respect to target **120** can be determined from Equation (2).

[0034] According to implementations of this disclosure, by using the above method to determine positions of target-hit points using a laser array and angles, the measurement data can achieve high precision. For example, in some implementations, the spatial resolution of the coordinates of the positions of target-hit points can reach 0.1 mm and the precision of the values of the hit ring can reach 0.01 rings.

[0035] As shown in FIG. **2**, the aforementioned laser transmitter and sensor strips can be connected to a signal controlling device or a signal controller. In some implementations, the signal controller can include, successively connected, a filter for light receiving and signal preprocessing, a device for coordinate computing and data processing, a signal processing unit or processor, and a data communicating device or communicator. For example, in FIG. **2**, power **202** can supply power for laser transmitter **204**, signal processor **212**, and data communicator using various adapting voltage (e.g., 12 V, 5 V, or 3.3V). Laser Receiver **206** can detect a bullet passing through the laser screens and transmit the signal to filter **208** for light receiving and signal preprocessing. Device **210** for coordinate computing and data processing then can use the signal preprocessed by filter **208** to calculate coordinates of the hit point of the bullet on the target, then output to signal processor **212**, which can further process the signal and forward data to data communicator (e.g., using RS485 standard) for transmission. In some implementations, filter **208** for light receiving and signal preprocessing can connect to the sensor strips, and signal processor **212** can connect to laser transmitter **204**.

[0036] FIG. **3** is a flow chart of information processing of a laser electronic target system according to implementations of this disclosure. The process can be initiated by the laser sensors. If a record is generated for detecting a bullet, the coordinate of the bullet can be generated and the data can be transmitted for further processing.

[0037] For example, at operation **302**, the detection process for a hit point of a bullet can be started by the laser sensors.

[0038] At operation **304**, it is determined whether data scanning is completed. For example, the data can be scanned to determine whether the bullet detection process is completed. If yes, process **300** can proceed to operation **316** which transmits the data. If not, process **300** can proceed to operation **306**.

[0039] At operation **306**, hardware parameters of the system can be initialized.

[0040] At operation **308**, it is determined whether interrupts are generated. If not, process **300** can proceed to operation **314** for malfunction processing. If yes, process **300** can proceed to operation **310**.

[0041] At operation **310**, data of the hit point can be received and processed, for example, by configurations shown in FIG. **2**.

[0042] At operation **312**, based on the received and processed data, coordinates of the hit point can be computed.

[0043] At operation **314**, data can be further processed and a malfunction can also be processed if any exists. When this operation ends, process **300** can go back to operation **304** to determine whether the detection process is completed.

[0044] As shown in FIG. **4**, the bullet trap of the system can be in the shape of a square pyramid with the base removed, shown as shape **402** in FIG. **4**. In other implementations, the bullet trap can include other shapes such as a triangular pyramid, a cone, a dome, or a box. In some implementations, each included angle between two adjacent lateral faces of the square pyramid can be 60 degrees. The bullet trap can include bullet buffering member **404**, which can further include one or more (e.g., three) groups of hanging iron chains **406** and a sliding bullet collector or chamber **408**. The bullet trap can work as follows to capture bullets, for example: when an individual shoots, the bullet can enter shape **402** from the square face with high speed, then deform due to huge instant impact and slide into bullet buffering member **404** under inertia; bullet buffering member **404** can use three groups of interlacing iron chains **406** to further reduce the inertia of the bullet, by which the impact of the bullet can be reduced to 0 after colliding with iron chains **406**, allowing the bullet to fall freely into bullet collector **408** at the bottom of the bullet buffering member **404**.

[0045] As shown in FIG. **5**, a laser electronic target having non-overlapping and crossing rectangular laser screens **502** and **504**, as well as a bullet trap having components **402-408** as described above, can be secured at a support to form a laser electronic target system, according to implementations of this disclosure. As shown in FIG. **5**, the center line of the bullet trap and the laser electronic target can be aligned, and the planes of the laser screens **502** and **504** can be perpendicular to the center line.

[0046] According to this disclosure, the laser electronic target system disclosed herein uses a method to determine positions of target-hit points using a laser array and angles, which can increase efficiency, reduce cost, and avoid interferences from other electromagnetic or ultrasonic sources, thus being suitable for shooting training and matches.

What is claimed is:

1. A laser electronic target system using non-overlapping and crossing rectangular laser screens, comprising:

a bullet trap; and

a first and second rectangular laser screens generated in front of the bullet trap, wherein each of the first and second rectangular laser screens is generated by:

a detachable laser transmitter; and

a laser receiver comprising a first sensor strip and a second sensor strip, wherein a first end of the first sensor strip is perpendicularly connected to a second end of the second sensor strip,

wherein each sensor strip comprises 100 to 150 laser sensors, and

wherein the laser transmitter and the first and second sensor strips are on a same plane.

2. The laser electronic target system of claim **1**, wherein for each of the first and second rectangular laser screens, the laser transmitter has 100 mW power and emits visible line laser at 650 nm wavelength, and the emitted visible line laser projects in a triangle shape with a 120 degree vertex angle at the laser transmitter and irradiates evenly to the laser sensors of the perpendicular first and second sensor strips, and each of the sensor strips comprises 115 laser sensors with 1.8 mm spacing, wherein a responsive time for each laser sensor is less than 10 ns.

3. The laser electronic target system of claim **2**, wherein the visible line lasers emitted by the first and second laser transmitters respectively irradiate to the first and second laser receivers having perpendicular sensor strips.

4. The laser electronic target system of claim **1**, wherein for at least one of the first rectangular laser screens, the laser transmitter and the laser receiver are connected to a signal controller,

wherein the signal controller comprises, successively connected, a filter for light receiving and signal preprocessing, a device for coordinate computing and data processing, a signal processor, and a data communicator, and

the filter for light receiving and signal preprocessing connects to the first and second sensor strips, and the signal processor connects to the laser transmitters.

5. The laser electronic target system of claim **1**, wherein the laser receivers of the first and second rectangular laser screens form a rectangular frame in a plane perpendicular to a center line of the bullet trap, and the laser transmitters of the first and second rectangular laser screens are positioned on a same edge of a rectangular frame.

6. The laser electronic target system of claim **1**, wherein the bullet trap comprises a shape of a square pyramid with the base removed.

7. The laser electronic target system of claim **1**, wherein the bullet trap comprises a bullet buffering member, wherein the bullet buffering member comprises a plurality of hanging chains and a sliding bullet receiver.

8. A laser electronic targeting device, comprising:

a casing;

a controller;

a first laser transmitter in communication with the controller and coupled to the casing, the first laser transmitter emitting a first laser defining a first plane;

a second laser transmitter in communication with the controller and coupled to the casing in a position different from the first laser transmitter, the second laser transmitter emitting a second laser defining a second plane different from the first plane, wherein the second laser transmitter is displaced from the first laser transmitter such that the second plane defined by the second laser is parallel to the first plane defined by the first laser;

a first laser receiver in communication with the controller and coupled to the casing, the first laser receiver being capable of receiving the first laser emitted by the first laser transmitter; and

a second laser receiver in communication with the controller and coupled to the casing, the second laser receiver capable of receiving the second laser emitted by the second laser transmitter.

9. The laser electronic targeting device of claim **8**, further comprising:

a bullet trap, coupled to a support that is coupled to the casing, comprising:

a housing with a first end located opposite a second end, wherein the first end of the housing defines a first opening having a first area, and the second end defines a second opening having a second area, the second area being lesser than the first area;

a bullet buffering member with a top surface located opposite a bottom surface, the bullet buffering member being coupled to the second end of the housing; and

a bullet collecting chamber coupled to the bottom surface of the bullet buffering member.

10. The laser electronic targeting device of claim **8**, wherein the first and second lasers emitted from the first and second laser transmitters are line laser beams.

11. The laser electronic device of claim **8**, wherein each laser receiver comprises a first laser sensor strip having a first end located opposite a second end and a second laser sensor strip having a third end located opposite a fourth end,

wherein the first end of the first laser sensor strip is connected to the third end of the second sensor strip.

12. The laser electronic device of claim **11**, wherein the first and second laser receivers are connected.

13. The laser electronic device of claim **11**, wherein at least one laser sensor strip of the first and second laser receivers comprises 100 to 150 laser sensors.

14. The laser electronic device of claim **8**, wherein the first laser receiver is located on the first plane and the second laser receiver is located on the second plane.

15. The laser electronic device of claim **8**, wherein the controller comprises a filter for light receiving and signal preprocessing; a device for coordinate computing and data processing, a signal processing unit, and a data communicating device.

16. The laser electronic device of claim **8**, wherein the casing is rectangular, and the first and second laser transmitters are located on a same side of the casing.

17. A laser electronic target system, comprising:

a bullet trap; and

a plurality of laser screens generated in front of the bullet trap,

wherein each of the plurality of laser screens is respectively in a plane mutually parallel to other laser screens,

wherein each of the plurality of laser screens is generated by a laser transmitter and a laser receiver, wherein the laser transmitter and the laser receiver are located on the plane that the laser screen resides in, and

wherein each laser transmitter of the plurality of laser screens emits laser in a direction different from other laser transmitters.

18. The laser electronic target system of claim **17**, wherein the laser receiver comprises a first sensor strip with a first end located opposite a second end and a second sensor strip with a third end located opposite a fourth end, and the first end of the first sensor strip is connected to the third end of the second sensor strip.

19. The laser electronic target system of claim **18**, wherein at least one sensor strip of the first and second laser receivers comprises 100 to 150 laser sensors.

20. The laser electronic target system of claim **17**, wherein the plurality of laser screens generated in front of the bullet trap is rectangular.

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