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Firearm firing control system and firearm optics positional assembly

Abstract

A firearm optics positioning assembly is configured to capture multiple images of a field of view of a firearm optic including a first image and generate a perceptible signal upon detection of a second image of the field of view being substantially the same as the first image.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims priority and the benefit of U.S. patent application Ser. No. 17/869,688, titled “Firearm Firing Control

System and Red Dot Positioning Assembly", filed Jul. 20, 2022, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The disclosure herein relates generally to a firearm optics positioning assembly and related methods for image capture, comparison, and cue generation.

Innovation and Competitive Advantage

[0003] A business is the result of immense hard work, dedication, and perseverance. However, this is not enough in a very competitive market. The key to success is the ability to adapt to change, respond to current market needs, and anticipate future market trends with the influx of fresh innovative ideas. Innovation adds value and is important for future growth, provides a competitive advantage, and distinguishes a business as a leader, not a follower. To be innovative a business must be willing to view problems differently and offer creative solutions. Innovation brings new products to market, provides consumers with purchasing options, and increases market share. To promote new value and growth it is important for businesses to have a vision and a willingness to invest in future technologies that may not be immediately evident.

[0004] The firearm industry that includes manufactures of aftermarket products such as red dot optics is extremely competitive. Firearms and their development have contributed to the independence and freedom of many countries from the invasion, occupation, and oppression of others. The right to bear arms is so important it is specified in the Constitution of the United States. Firearms may be used for many purposes including hunting, recreation (sport/target/training), security, law enforcement, and military operations, to name a few. These are areas where improvements in firearm technology is important and constantly evolving.

[0005] The firearm firing control system, the firearm optics positioning assembly, and more specifically the red dot positioning assembly as described herein offer not only a creative and innovative solution to the problem of improving shooting consistency and accuracy but may well provide a strategic and lifesaving approach to those injured in combat. Competitive shooters will find that the effortless use of a touchless trigger control provides a relatively more consistent and accurate shooting experience when compared to "pulling the trigger." In a similar manner, the elderly or those with physical impairments that limit hand strength might be better able to adapt to a touchless trigger control. The combination of touchless trigger control and red dot positioning has potential for military applications having life and death consequences. The touchless trigger control might allow a soldier to fire when wounded and otherwise unable to "pull the trigger" or utilize the red dot positioning assembly to capture an image and to fire upon an enemy combatant when cued without having to be in the line of fire.

[0006] The foreseeable uses and applications for the firearm firing control system and red dot positioning assembly are there for those with the vision to think outside the box and the willingness to explore creative possibilities in the evolutionary process of developing new and innovative firearm technologies.

BACKGROUND

[0007] Section 18 U.S.C. 921(a)(3) defines a firearm broadly to include "any weapon (including a starter gun) which will or is designed to or may readily be converted to expel a projectile by the action of an explosive." In this regard, firearms include handguns (e.g., revolvers and pistols) and long guns (e.g., rifles and shotguns).

[0008] Firearm safety is widely recognized as a very important element of handling and shooting a firearm. There are four universal firearm safety rules which, although often phrased in slightly different manners, are: (1) treat all firearms as if they are loaded; (2) always keep the muzzle of the firearm pointed in safe direction; (3) keep your finger off the trigger until you have decided to shoot; and (4) be sure of your target and what is behind it. While these rules apply to the actions of the shooter, firearm safety is also a major consideration for firearm and accessory manufacturers.

For example, some firearms include a manual safety, a trigger safety, a grip safety, a firing pin block, a de-cocker, and/or similar features for promoting safe handling and minimizing the risk of an accidental discharge.

[0009] While there are numerous operating methods for firearms, the basic principle of operation is the same. The firearm is loaded with a round and pressure is applied to a trigger (usually measured in pounds). The trigger is mechanically linked to various parts (referred to herein collectively as a trigger assembly), including in one example a trigger bar and a hammer under tension. Depressing the trigger (also often referred to as pulling or squeezing the trigger) moves the trigger bar and a sear to release the hammer tension, allowing the hammer to move freely to engage a firing pin which then strikes a primer on the casing of the round, causing a chain reaction within the casing leading to an explosion and subsequent discharge of a projectile from the firearm.

[0010] Factors that may affect the accuracy of hitting an intended target with the projectile include weather and other conditions over which the shooter has little control, as well as variables over which the shooter has some control such as stance, sight alignment and sight picture, recoil management, and trigger control. All the variables are interrelated to some degree and must be properly implemented to achieve consistency and/or accuracy in hitting the intended target. For example, a shooter may have proper body and hand positioning that creates a stable base and provides adequate recoil management of the firearm but be unable to establish proper sight alignment and sight picture and/or properly implement trigger control.

[0011] Sight alignment and sight picture have traditionally required alignment of the front and rear sights with each other, and alignment of the front sight on the intended target. However, with the use of relatively recent optics technology known as “red dot,” the task of “sight alignment” can be simplified and in most cases replaced by ensuring the red dot of an optic is visible on the intended target. All other factors remaining the same, the use of red dot technology has greatly increased the consistency and accuracy of shooters.

[0012] Proper trigger control can also greatly increase consistency and accuracy. The way the trigger is manipulated has a direct and dramatic effect on accuracy. Every shot taken is affected by the way the shooter pulls the trigger. This includes how the shooter depresses the trigger (gently, firmly, with a jerk, etc.), the amount of trigger pressure the shooter applies (light, moderate, heavy, etc.), the part of the finger the shooter uses (tip, crease, fatty area, etc.), whether the trigger pull is straight rearward or at some angle, and whether the trigger pull is smooth and steady. To improve trigger control, manufactures have designed firearms requiring less pressure to actuate the trigger. However, a shooter must still contend with all the aforementioned factors every time the shooter pulls the trigger.

[0013] Therefore, there is a need for a mechanism that helps manage trigger control by further reducing or eliminating the requirement of applying pressure to the trigger.

SUMMARY

[0014] In accordance with one embodiment of the present invention, a firearm firing control system includes a touchless sensor firing control assembly operatively attached to a firearm. The assembly includes a sensor electrically connected to a power source and to a load. When the sensor senses movement, an activation voltage from the power source actuates the load which is mechanically connected to a trigger assembly of the firearm, thereby actuating the firing pin of the firearm. In this embodiment, the touchless firing control assembly is integrated with the firearm. In another embodiment, the touchless firing control assembly is separate from the firearm and may be retrofitted as an after-market product. An optional power switch allows selective activation and deactivation of the power source.

[0015] In accordance with one embodiment of the present invention, the firing control assembly is configured to work in combination with a red dot positioning assembly operatively connected to the firearm. The red dot positioning assembly is configured to capture and store a first image within a field of view of a red dot optic. In this embodiment, the actuation voltage is sent from the power

source to the load upon both: i) subsequent detection of a second image within a field of view of the red dot optic and determination that the second image is substantially the same as the first image; and ii) detection of movement by the touchless sensor. This feature may be selectively activated and deactivated along with the sensor circuit by using the power switch to deactivate the power source, or independently of the sensor circuit by using an independent switch to break the corresponding logic circuit for this feature.

[0016] In accordance with one embodiment of the present invention, a firearm optic positioning assembly or a red dot positioning assembly is configured to be operatively connected to an optic and configured to capture a first image of a field of view of the optic and generate a cue upon determination that a second image of a field of view of the optic is substantially the same as the first image. In one embodiment, the firearm optics positioning assembly or the red dot positioning assembly includes a vision capture device, a storage device, a recognition circuit, a processor and processor elements. The vision capture device is configured to capture the first image. The storage device is configured to store the first image. The processor, processor elements and recognition circuit are configured to detect the second image. The firearm optics positioning assembly or the red dot positioning assembly is configured to output a cue upon determination that the second image is substantially the same as the first image.

[0017] Various embodiments of the subject matter described herein will become readily apparent to those skilled in the art from the following detailed description having reference to the attached figures, the subject matter described herein not being limited to any embodiment or example.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** is a cut-away view of the mechanical components of a PRIOR ART hammer fire, semi-automatic handgun with a round chambered and the hammer cocked.

[0019] FIG. **2** is a cut-away view of the mechanical components of a PRIOR ART striker fire, semi-automatic handgun with a round chambered.

[0020] FIG. **3** shows the handgun of FIG. **2** with the addition of a touchless firearm firing control assembly in accordance with an embodiment of the present invention.

[0021] FIG. **4** shows a circuit diagram of a touchless sensor firing control assembly in accordance with an embodiment of the present invention.

[0022] FIG. **5** shows various locations on a firearm where sensors of the touchless sensor firing control assembly may be placed in accordance with certain embodiments of the present invention.

[0023] FIG. **6** shows a direct current (DC) generator operatively connected as a power source to a touchless firearm firing control system in accordance with an embodiment of the present invention.

[0024] FIG. **7** shows a firearm optics positioning assembly and more specifically a red dot positioning assembly operatively connected to a handgun in accordance with an embodiment of the present invention.

[0025] FIGS. **8**A-**8**D show the red dot positioning assembly of FIG. **7** in different arrangements as may be adapted for integration into various known red dot optics.

[0026] FIG. **9** shows a red dot positioning assembly and more specifically a red dot positioning assembly and a touchless sensor firing control assembly combination operatively connected to a handgun in accordance with an embodiment of the present invention.

[0027] FIG. **10** shows a multi-position switch and circuit configuration of the red dot positioning assembly and a touchless sensor firing control assembly combination shown in FIG. **8** in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

[0028] The invention relates to a firearm firing control system and related methods, and more particularly to a touchless sensor firing control assembly for touchless control of the firing of a firearm to enhance shooting consistency and accuracy. Exemplary embodiments will be described with reference to the accompanying figures.

[0029] FIG. **1** shows an example of a firearm **5**, in this regard, a hammer-fire, semi-automatic handgun, with a round **10** chambered and the hammer **15** cocked. Pulling back on the slide **20** engages the slide **20** with the hammer **15** causing the hammer **15** to rotate about a central axis **25**. The hammer **15** is tensioned by a hammer main spring **30**. Rotation of the hammer **15** permits a sear **35** to engage a notch **40** on the hammer **15** and retain the hammer **15** in a cocked position. A trigger bar **45** is connected between the trigger **50** and the sear **35**. Some firearms may also include a sear disconnect, a firing pin block, an internal safety lever, or other components. However, in general, placing pressure on the trigger **50** moves the trigger bar **45** to disengage the sear **35** from the notch **40**, allowing the hammer **15** to rotate and engage the firing pin **55**. The hammer **15** forces the firing pin **55** to contact the primer **105** of the chambered round **10** causing an explosion within a casing **90** that retains a projectile **60**. In addition to expelling the projectile **60** from the barrel of the handgun **5**, the force of combustion forces the slide **20** back to eject a spent casing **90**, cock the hammer **15**, and reset the internal mechanics of the handgun **5** before the slide **20** then either moves forward due to spring tension, chambering another round **10**, or remains locked back in a slide-lock position if no more rounds **10** are available in the magazine to be chambered.

[0030] FIG. **2** shows another example of a firearm **5**, in this regard, a striker-fire, semi-automatic handgun, with a round **10** chambered. While the internal features of the striker-fire handgun shown in FIG. **2** differ from the internal features of the hammer-fire handgun shown in FIG. **1**, the basic operation of pulling a trigger **50** to move a trigger bar **45** to allow a firing pin **55** to contact a primer **105** of a chambered round **10** is similar.

[0031] More specifically, as shown in FIG. **2**, the trigger bar **45** engages the striker **80** to prohibit the firing pin **55** from contacting the primer **105** of the chambered round **10**. As the trigger **50** is pulled, a connector **85** engaged with the trigger bar **45** forces the trigger bar **45** downward to release the striker **80** from engagement with the trigger bar **45**. Since the striker **80** is under spring tension, disengaging the striker **80** from the trigger bar **45** pushes the striker **80** forward causing the firing pin **55** to contact the primer **105** of the chambered round **10**. The ensuing explosion expels the projectile **60** from the barrel of handgun **5**, and forces the slide **20** back to eject a spent casing **90** and reset the internal mechanics of the handgun **5**, including a reset and engagement of the trigger bar **45** with the striker **80** before the slide **20** moves forward and chambers another round **10** (or remains in slide-lock if no more rounds **10** are available). FIG. **2** also shows two elective safety features including a trigger safety **95** and a firing pin safety **100**.

[0032] Regardless of the type of firearm, the basic structure and process for operating a fireman is similar across all platforms. A shooter must apply pressure to a trigger **50** to release a firing pin **55** that contacts the primer **105** of a round **10** leading to an explosion and a projectile **60** then being expelled from the firearm **5**. Thus, proper trigger control is an important consideration in maintaining consistent and accurate shooting, and any feature of a firearm that improves trigger control is valued.

[0033] FIG. **3** shows the hammer-fire firearm **5** of FIG. **2** further including a touchless firearm firing control assembly **110** in accordance with an embodiment of the present invention. The firearm **5** and the firing control assembly **110** in combination represent a touchless firearm firing control system **2**. The firearm **5** shown in FIG. **3** includes the trigger **50**, the trigger bar **45**, the connector **85**, the striker **80**, and the firing pin **55**, with a chambered round **10**, as generally shown in the handgun **5** of FIG. **2**. The firing control assembly **110** shown in FIG. **3** includes a sensor **115**, a power source **116**, a power on/off switch **125**, a load **130** (shown as an electro-mechanical linkage), and mechanical/electrical connectivity **135** between the sensor **115**, power source **116**, power switch **125**, and load **130**. The size, dimensions, operating characteristics, positioning, and combination of the elements of the firing control assembly **110** may differ for various firearms. As such, each firearm should be assessed for practical application of the subject matter disclosed herein.

Sensor **115**

[0034] Various types of sensors **115** may be used. One example is a proximity sensor that detects movement or presence of an object **190** without making physical contact with the object **190**, then converts the information of detected movement or presence into an electrical signal. In other words, a proximity sensor is a touchless sensor for the detection of object movement. With firearms, the relevant object **190** moving is typically a finger (as shown in FIG. **3**) or more precisely, a portion of a finger, and the relevant movement is typically movement within the trigger guard **140**. A proximity sensor can sense the presence of the object **190** (e.g., a finger) by sensing object movement in the sensor's coverage zone, which may vary for different sensors based on manufacturer specifications or may even be adjustable. The coverage zone may entail parameters such as distances in x-axis, y-axis, and z-axis directions (measured in straight lines or curves) and/or sensitivity. In response to detection of such movement, the proximity sensor sends or allows to pass an electrical signal to a load **130**. There are many types of proximity sensors, and each detects the presence of an object **190** in a unique way. In the touchless sensor firing control assembly **110** shown in FIG. **3**, the sensor **115** may be embodied as a proximity sensor including a photoelectric sensor, a capacitive proximity sensor, or a similar sensor.

[0035] A photoelectric sensor is used to detect the presence or absence of an object **190** or for measuring the distance between a point and an object using a light. A photoelectric sensor consists of an emitter such as a light emitting diode (LED) or laser diode for emitting light and a receiver such as a photo diode or photo transistor for receiving the light. Depending on the type of photoelectric sensor, the emitter and receiver may be housed in separate units, or the emitter and receiver may be housed in the same unit. The emitter converts an electrical signal from a power source to light energy such as a beam of visible light or infrared light. When the emitted light is interrupted, as in a thru-beam sensor, or reflected/diffused, as in a retro-reflective or diffuse-reflective sensor respectively by the object **190**, the amount of light that arrives at the receiver is changed. The receiver detects the change in light amount and converts it to a digital output of either of an “on” or “off” switched output state.

[0036] With a photoelectric sensor the terms “light on” and “dark on” are used to define what the sensor output is doing in the absence or presence of light at the receiver of the photoelectric sensor. In the “light on” mode the output from the sensor turns on when the receiver detects light from the emitter whereas in the “dark on” mode the output from the sensor turns on when the receiver detects no light from the emitter. The sensor output to a load may be a positive voltage (PNP or source output) or a negative voltage or ground (NPN or sink output). As disclosed herein, the output of the photoelectric sensor may be electrically connected to a load **130** such as the electro-mechanical linkage shown in the drawings, to induce a mechanical action.

[0037] A capacitive proximity sensor is based on the principle of a parallel plate capacitor. A parallel plate capacitor consists of two parallel plates separated by a dielectric material. Once connected to a power source **116**, an electric field is created as the parallel plates become oppositely charged creating an electric field between the plates that holds a capacitive charge. The ability of a capacitor to store electrical charge when a voltage is applied is called capacitance. The capacitance of a capacitor is directly proportional to the ability of the dielectric material between the two charged plates to store a charge, known as the dielectric constant, and inversely proportional to the distance between the two plates.

[0038] A dielectric-type capacitive proximity sensor can detect any object **190** including a finger that has a dielectric constant greater than air. The dielectric capacitive sensor has two parallel plates linked to an oscillator and a detector circuit acting as switch inside the sensing head that operate like an open capacitor with air acting as the dielectric. When no object is present the capacitance between the plates will be at a low initial value. However, when an object **190** such as a finger having a dielectric constant greater than air is in proximity to the plates, i.e., the sensor detects object movement, the capacitance between the plates increases. An increase in capacitance increases the amplitude of oscillations in the oscillator. When the amplitude exceeds a specific value, the detector produces an electrical output. With a capacitive proximity sensor, the terms “normally open” or “normally closed” are used to define the sensor output when an object **190** is detected. As disclosed herein, the output of the capacitive proximity sensor may be electrically connected to a load **130** such as the electro-mechanical linkage shown in the drawings, to induce a mechanical action.

[0039] Turning to FIG. **4**, a basic circuit **65** is shown for the sensor assembly **110** in accordance with an embodiment of the present invention. FIG. **4** shows representative examples of the power source **116** including positive and negative terminals, the sensor **115**, an internal detector switch **117** of the sensor **115** for detection of an object **190**, the load **130**, and a power switch **125**. The circuit further includes a capacitor **122** and resistor **127**. The capacitor **122** and load **130** form a circuit branch **70** in parallel with a circuit branch **75** containing only the resistor **127**.

[0040] In one example of circuit operation, the power switch **125** used to selectively engage or disengage the sensor assembly **110** is placed to an “on” position or engage position to apply power to the sensor **115**. With power being supplied to the sensor **115**, if an object **190** is detected by the sensor **115**, an internal detector switch **117** closes, thus completing the circuit **65** such that voltage from the power source **116** is distributed equally across parallel branches **70** and **75** of the circuit **65**. Initially, no voltage potential appears across the capacitor **122**. In one example, if the power source **116** is a 9-volt battery, after completing the circuit **65**, a 9-volt potential is placed across the resistor **127** and load **130**, and no voltage potential is placed across the capacitor **122**. The voltage from the power source **116** applied to the load **130** is equal to or greater than the activation voltage required to activate the load **130**. As such, after completing the circuit **65**, an activation voltage is applied to the load **130** causing directional movement of the load **130** thus causing the firing pin **55** to strike the primer **105**.

[0041] As current flows through the parallel branches **70**, **75** of the circuit **65**, the capacitor **122** is charged. The charge on the capacitor **122** opposes current flow. As current flow is reduced through circuit branch **70**, the voltage across the load **130** is correspondingly reduced to a level below the activation voltage. The charge on the capacitor **122** continues to rise until current ceases to flow in circuit branch **70**. As the load **130** no longer has the activation voltage applied, cycling of the slide **20** on the firearm **5** mechanically resets the trigger bar **45**.

[0042] With the capacitor **122** fully charged and both the power switch **125** and the internal detector switch **117** closed, current flows only in circuit branch **75**. The steady state of the circuit **65** is maintained until either the power switch **125** or the internal detector switch **117** is opened. In one example, removing the object **190** from the coverage area of the sensor **115** opens the internal detector switch **117**. With the internal detector switch **117** open, the capacitor **122** discharges. In this regard, the potential across the capacitor **122** is discharged across the resistor **127** and the load **130**. In one example, the resistor **127** is of a sufficient resistive value so that the voltage across the load **130** remains below the actuation voltage. With the internal detector switch **117** open and the capacitor **122** discharged, no current flows in the circuit **65** and all voltages remain at zero volts until the internal detector switch **117** is closed by detection of an object **190**. At that time, the load **130** again receives an activation voltage from the power supply **116**, and the cycle repeats.

[0043] In summary, when a shooter places a finger in the presence of the proximity sensor, as may by the case when placing a finger in the trigger guard, the firearm will fire, and the slide will re-cycle and reset the trigger bar in the normal manner. Regardless of how long the finger remains in the presence of the sensor, the firearm will only fire once. In this regard, the finger must be moved from the coverage zone of the sensor and again moved into the coverage zone to allow a new detection of the finger by the sensor before the firearm once again fires. The firearm will fire each time the sensor detects the action of moving the finger in-and-out of the coverage zone. Placing the power switch **125** into an "off" position will open the power switch **125** to disengage the firing control assembly **110** and allow the trigger **50** to function in the traditional manner.

[0044] While a photoelectric sensor (including an ultra-minute/miniature photoelectric sensor) and a dielectric-type capacitive sensor are types of proximity sensors that may be considered as sensors **115** for the detection of the presence or absence of an object **190** such as a finger within a trigger guard **140** of a firearm, other sensor types may also be appropriate. Likewise, the physical properties including size, weight, and durability, as well as the electrical properties including input and output voltages, current handling capabilities, detection sensitivity, and other considerations of any sensor **115**, may be selected based on a variety of factors including the space limitations for positioning within the firearm as well as operational compatibility with other elements of the touchless sensor firing control assembly **110**.

[0045] Turning now to FIG. **5**, a trigger guard **140** of a firearm **5** is shown with examples of possible locations (S**1**-S**6**) for one or more proximity sensors **115** to be placed. These examples allow detection of the presence of an object **190** within the coverage zone of sensor(s) **115**, for example directly in front of the trigger **50** or within the trigger guard **140**. The locations shown are representative and not intended to show the exact location of any particular sensor(s) **115**. In this regard, location S**1** is a possible location for a retro-reflected sensor **115** having a reflective substance (S**1**A) positioned opposite to reflect a beam projected from an emitter of the sensor **115** back to a receiver of the sensor **115**. Location S**2** is a possible location for a diffuse-reflective sensor **115** in which the projected beam from an emitter of the sensor **115** is reflected by the detected object **190** back to a receiver of the sensor **115**. Location S**3** is a possible location of a thru-beam sensor **115** projecting a beam from an emitter of the sensor **115** through an orifice S**4** formed in the trigger **50** of the firearm **5** to a receiver S**5** positioned in alignment with the beam from the emitter of the sensor **115**. Location S**6** is a possible location of a dielectric-type capacitive proximity sensor **115**.

[0046] The size, shape, and/or configuration of any trigger guard or housing **140** and trigger **50** should be considered in determining the actual type of sensor **115** used and its location relative to the trigger guard **140**. For example, a flat trigger, a curved trigger, and a trigger having a trigger safety may each offer certain advantageous or disadvantages in one instance when compared to the alternative trigger options.

[0047] In one embodiment, multiple sensors **115** with multiple corresponding detector switches **117** are used such that multiple detections of movement in multiple corresponding locations are required to activate the corresponding switches **117** and complete the circuit **65**. For example, a first sensor **115** may be configured to detect movement within the trigger guard **140**, and a second sensor **115** may be configured to detect movement in the grip of the firearm **5**. Logic circuitry may be preprogrammed, programmable, or user-adjustable to set a certain time period within which the two movements must be detected relative to each other to activate the corresponding switches. For example, if a first sensor **115** detects movement, and the second sensor **115** detects movement within 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, or 5.0 seconds, or any other suitable time period, that would be indicative of the shooter intending to fire the firearm **5**. Alternatively, the time period may be dependent on which sensor **115** senses movement first. For example, if the first sensor senses movement in a zone of coverage at the back of the handgrip, indicating the firearm is in the shooter's hand, the time period may be set to effectively infinity (or constantly reset) until the first sensor **115** detects another movement (e.g., removal of the hand from the handgrip), thus converting the logic circuit to effectively the single sensor embodiment in which the actuation voltage is sent to the load **130** upon detection of movement by the second sensor **115**. In this two-sensor embodiment, the actuation voltage will not reach the load **130**, and thus the trigger bar **45** will not be actuated to release the firing pin **55**, unless motion is detected in both zones of coverage within the applicable time period. This configuration could be used as an extra safety measure in suitable implementations of the invention.

Power Source **116**

[0048] Power source **116** connects electrically to the sensor **115** to provide a supply voltage to the sensor **115**. As shown in FIG. **4**, upon activation of the sensor **115** (due, e.g., to detection of the presence of an object **190**), the sensor **115** outputs the supply voltage from the power source **116** to the load **130**. Voltage requirements for the sensor **115** and sensor output voltage may vary depending on the type of sensor **115** utilized, operating parameters of the sensor **115**, and voltage requirement of the load **130**. Choice of power source **116** may also take into consideration size and space limitations of the firearm **5** for placement of the power source **116**. In this regard, suitable power sources **116** may include, but are not limited to a 3V ENERGIZER 1632 lithium battery, a 3V CR 2032 LiCB battery, a CR123A 3v Lithium battery, a 28A DURACELL 6V battery, or an A23 12V battery.

[0049] The power source **116** may be a dedicated power source or may be shared with other components. For example, many firearms **5** use a red dot optic sighting device that typically includes a battery to provide power to generate the red dot optical beam. While some modification of the red dot device may be required, in some applications it may be suitable to electrically connect and utilize the battery of the red dot optic to supply power to the sensor **115**.

Load **130**

[0050] Load **130**, for example an electro-mechanical linkage, is operatively connected to the trigger bar **45** to allow the firing pin **55** to engage the primer **105** once the load **130** receives the actuation voltage from the sensor **115**. In this regard, the load **130** is electrically connected to the sensor **115** and power source **116**, and operatively connected to the fire firearm **5** upon detection of object movement by the sensor **115**. More specifically, the load **130** may be a linkage electrically connected to the sensor **115** that receives an activation voltage from the sensor **115** upon detection of an object **190** by the sensor **115**, and mechanically connected to the trigger assembly of the firearm **5** to disengage the firing pin **55** to fire the firearm **5**. Typically, the load **130** will be connected directly to the trigger bar **45**.

[0051] The load **130** (typically electro-mechanical linkage) may be a solenoid, a spring, a relay, a moveable arm/plunger, or any suitable device that can receive an electrical input such as supply voltage and provide a mechanical output. For example, a solenoid includes a coiled wire having a central core for positioning of a plunger (linkage). When a voltage is applied to the coil a magnetic field is created that causes a directional movement of the linkage. In another example, power is applied to a small DC motor to cause rotary motion in an armature that is mechanically linked by one or more gears of the linkage to cause directional movement of the linkage. In still another example, a relay having a control circuit that receives power to create a magnetic field to attract or repel a magnetic arm provides directional movement to a linkage. In each example, a spring or the movement of the slide in combination with the circuit configuration as shown in FIG. **4** is used to return the load **130** to a reset position.

[0052] The mechanical output of the electro-mechanical linkage **130** is a directional movement of sufficient force to disengage the trigger bar **45** from engagement with the firing pin **55** or the striker **80** to allow the firing pin **55** to engage the primer **105**. After the primer **105** ignites and an explosion occurs, the energy of the explosion forces the slide **20** backward and then the energy of a recoil spring forces the slide **20** forward to chamber another round **10**, reset the slide **20**, and reset positioning of the electro-mechanical linkage **130** relative to the trigger bar **45**. The cycle of the output voltage from the sensor **115** to the electro-mechanical linkage **130** upon detection of an object **190**, mechanical motion of the electro-mechanical linkage **130** to disengage the trigger bar **45**, and reset of the slide **20**, the trigger bar **45**, and the electro-mechanical linkage **130**, repeats during operation of the firearm **5**, or remains in slide-lock if no more rounds **10** are available.

Power Switch **125**

[0053] Touchless firing control assembly **110** may be disabled so as not to affect normal operation of the firearm **5**. With the assembly **110** disabled, the shooter can apply pressure to the trigger **50** and the firearm **5** will operate as mechanically designed without interference by the firing control assembly **110**. This is accomplished by use of the power switch **125** that allows the shooter to selectively engage/disengage the firing control assembly **110**. In the OFF position, the power switch **125** opens the circuit **65** so the electrical connectivity **135** between the power source **116**, sensor **115** and load **130** is broken or interrupted.

[0054] The touchless firearm firing control assembly **110** may be selectively engaged and disengaged with the power switch **125**. Design of the circuit **65** and the ability to selectively engage the control assembly **110** offers the shooter a variety of ways to fire the firearm **5**. In this regard, with the power switch **125** in the OFF position, the touchless firearm firing control assembly **110** is inoperable. As such, in the OFF position the power switch **125** functions as a safety mechanism to prevent accidental discharge of the firearm in a touchless manner. Accordingly, the firearm is operated or fired in a traditional manner by pulling the trigger.

[0055] With the power switch **125** in the ON position the firearm **5** may be fired in a touchless manner or in the traditional manner using the trigger **50**. For example, with the control assembly **110** operational, placement of a finger **190** into the trigger guard **140** permits touchless firing control of a first shot from the firearm **5**. Subsequent shots may be fired using the touchless firing control assembly **110** by moving the finger **190** in-and-out of the coverage zone of the sensor **115**. Alternatively, the second shot or any follow-up shots may be fired using the trigger **50** or in a touchless manner using the touchless firing control assembly **110**. Accordingly, the power switch **125** and circuit **65** of the touchless firearm firing control assembly **110** provide an enhanced level of safety while offering the shooter a variety of firing options in operation of the firearm **5**.

Mechanical and Electrical Connectivity **135**

[0056] Mechanical connections and/or electrical connectivity **135** are provided between the elements of the sensor assembly **110** including the sensor **115**, power source **116**, power switch **125**, and load **130**, as required for selective operation of the touchless firearm firing control system **2**. Hardware such as fasteners, nuts, washers, seals, etc., as well as solder joints and other common elements used in forming connections between elements are not shown but are well-known.

DC Generator Power Source

[0057] While a battery is a suitable power source **116** for powering the sensor **115** and providing the actuation voltage to the load **130**, the linear mechanical motion of the slide **20** or rifle bolt moving back and forth during normal operation may be converted into electrical energy through the rotation of an armature **147** of a direct current (DC) generator **145** to charge the sensor **115** such as the dielectric-type proximity sensor. In this regard, FIG. **6** shows a representation of a direct current (DC) generator **145** operatively connected as the power source **116** in the touchless firearm firing control system **2**.

[0058] Armature **147** of the DC generator **145** is mechanically connected to receive the mechanical input from the slide **20** as the slide **20** is moved back-and-forth during the initial manual loading of a round **10** into the chamber of the firearm **5** (racking the slide) or during normal operation of the firearm **5** as the energy from the explosion of firing a round **10** is released. The DC generator **145** may be connected to the slide **20** in a variety of ways to impart the mechanical motion of the slide **20** to the armature **147** of the DC generator **145**. For example, friction between the slide **20** and the armature **147** rotates the armature **147**, serrations on the bottom of the slide **20** mate with teeth on a gear positioned on the armature **147** to rotate the armature **147**, or a coiled wire attached to the armature **147** and connected to the slide **20** is extended and recoiled through material memory to rotate the armature **147**.

[0059] The DC generator **145** is electrically connected to the sensor **115**. Rotation of the armature **147** produces an instantaneous electromagnetic force (EMF) or “e” equal to B.Math.l.Math.v.Math.sinØ, where “B” is strength of the magnetic field, “l” is the length of conductor cutting the lines of magnetic force, “v” is velocity of the conductor, and “sinØ” is the angle of conductor to the lines of magnetic flux.

[0060] The dielectric-type proximity sensor **115** is essentially a capacitor. As such, the EMF of the DC generator **145** electrically connected to the sensor **115** charges the dielectric-type proximity sensor **115** to a sufficient charge for operation of the load **130**. The energy stored in the sensor **115** is discharged or released to the load **130** through an electrical connection with the sensor **115** when the sensor **115** detects the presence or absence of an object **190** such as a finger. The load **130** is operatively (mechanically) connected to the trigger assembly of the firearm **5** (typically to the trigger bar **45**) to disengage the trigger bar **45** allowing the firing pin **55** to engage the primer **105** to cause an explosion and release the energy stored in the casing **90**. The explosion and release of energy causes the slide **20** to move back-and-forth and the sensor **115** to be charged as the cycle of energy charge/discharge repeats during operation of the firearm **5**.
[0061] A battery will provide a relatively constant source of power as required to maintain activation of a beam in a photoelectric proximity sensor; however, a dielectric-type proximity sensor does not project a beam, so a continuous power source is not required. A charge on the dielectric-type proximity sensor is only required prior to the touchless detection of presence or absence of an object. Use of a DC generator **145** to periodically convert mechanical energy to electrical energy may be a suitable alternative power source to a battery.
Firearm Optics Positioning Assembly/Red Dot Positioning Assembly
[0062] FIG. **7** shows an example of a firearm optics positioning assembly **149** and more specifically a red dot positioning assembly **150** operatively connected to a firearm **5** in accordance with an embodiment of the present invention. Optics utilized for firearms incorporate a variety of optic technologies including a scope, a low-powered variable optic (LPVO), a red dot sight, a reflex sight, a prism sight, and a holographic sight, as well as visual features to indicate that a firearm **5** is properly aimed at a target **180**. These features include but are not limited to a reticle or crosshair of a various design or pattern, a red dot, a green dot, a circle, and circle dot. As used herein, the term “firearm optics positioning assembly” **149** is intended to include the above-mentioned optic technologies and visual features. The terms “red dot optic” and “red dot” are intended to include the red dot sight, the reflex sight, the prism sight, and the holographic sight optics, as well as at least the red dot, green dot, circle, circle dot, or similar visual feature that aids the shooter in aiming the firearm **5**.
[0063] The firearm optics positioning assembly **149** or red dot positioning assembly **150** includes electro-mechanical connectivity **170** between the power source **116**, a power switch **126**, a red dot optic **152**, a vision capture device **155**, a storage device **160**, a processor **162** having processor elements **164**, a recognition circuit **163**, and a cue device **157**. The cue device **157** may be an audible device (e.g., a speaker or beeper), a visual device (e.g., an LED), or any other device sufficient to output a perceptible signal.
[0064] Generally, with a red dot optic **152** mounted on the firearm **5** as may be the case with either the firearm optics positioning assembly **149** or red dot positioning assembly **150**, while looking through a viewing plane of the red dot optic **152**, a shooter visually places a red dot **175** on an intended target **180**. The firearm optics positioning assembly **149** or the red dot positioning assembly **150** includes a vision capture device **155** positioned on the firearm **5** to capture a field of view **156** as seen by the shooter through the red dot optic **152**. The field of view **156** as seen by the shooter when looking through the red dot optic **152** is represented in FIG. **7** to the left of the vision capture device **155** as a red dot **175** positioned on the target **180**.
[0065] The vision capture device **155** may be for example, a camera or more particularly a fiber optic camera such as those used in the medical field, inspection, surveillance, etc. The vision capture device **155** may be connected directly with wires or wirelessly to a storage device **160** and processor **162** having processor elements **164**. The vision capture device **155** is configured to view images, capture an image, and transmit the captured image to the storage device **160** and/or processor **162**. Images captured are stored for later comparison to other images. In this regard, like well-known facial recognition systems, a recognition circuit **163** of the firearm optics positioning

assembly **149** or red dot positioning assembly **150** includes: extracting information from a database (storage); comparing the information, for example a digital map of a field of view **156**, with other information; and determining if the information from the database substantially matches the other information.

[0066] To populate the database, for example, the red dot **175** of the red dot optic **152** is positioned on an intended target **180**, as may be the case with a fixed target having a "bullseye." The vision capture device **155** is configured to capture one or more first images of the viewing field **156** of the red dot optic **152**. Capture of the first images may occur in a variety of ways including a push of a button, a swipe or tap of surface located on the vision capture device **155** or on the firearm **5**, or a verbal command from the shooter. The captured image is sent to the storage device **160** and/or processer **162** having processor elements **164**.

[0067] The processor **162** maps a fixed field of pixel locations corresponding to the red dot **175** positioned on the intended target **180**, i.e., the viewing field **156** captured by the vision capture device **155**, by using a known color/gray-scale pixel determination process including one or more processing elements **164** and program instructions for directing one or more processing elements with access to the storage device **160**. The red dot **175** of the red dot optic **152** may be interpreted as a white dot or other contrasting color from target the **180** to distinguish and map the field of pixel locations more accurately. The set of fixed field pixel locations is communicated and stored in the storage device **160** as database information.

[0068] Images appearing in the field of view **156** of the red dot optic **152** during use of the firearm **5** are continually communicated to the processor **162** and processing elements **164** by the vision capture device **155**. These images are compared by the recognition circuit **163** to the first image(s). When a viewing field **156** in the red dot optic **152** matches or is within a preset or otherwise determined degree of precision of matching any of the first image(s) stored in memory (i.e., substantially the same), such conditions represent the red dot **175** being positioned on or within a predefined distance of the intended target **180** and accordingly an input is provided to the cue device **157** which then cues the shooter that the red dot **175** is on the target **180**.

[0069] The first image of the field of view **156** may be removed or deleted from the storage device **160** in a similar manner as used to capture the first image. For example, if a single push of a button, a single swipe, single tap of surface located on the vision capture device **155** or on the firearm **5**, or an oral command from the shooter is used to capture an image, a double button push, double swipe, double tap, or alternative oral command from the shooter may be used to remove or delete the first image of the field of view **156** stored in the storage device **160**.

[0070] Accordingly, the firearm optics positioning assembly **149** is configured to capture multiple images of a field of view **156** of a firearm optic **152** including a first image and generate a perceptible signal or cue **157** upon detection of a second image of the field of view **156** being substantially the same as the first image. The firearm optics positioning assembly **149** includes a power source **116**, a visual capture device **155**, a storage device **160**, and a recognition circuit **163** operatively connected to each other, wherein the capture device **155** captures and transmits the first image to the storage device **160**; the recognition circuit **163** compares the first image to subsequent images captured by the capture device **155**; and the perceptible signal or cue **157** is generated upon detection of the second image being substantially the same as the first image. The firearm optics positioning assembly **149** further includes a processor **162** and processing elements **164** operatively connected, wherein the processor **162** maps a fixed field of pixel locations corresponding to the first image using program instructions for directing one or more of the processing elements **164**; and the fixed field of pixel locations is communicated and stored in the storage device **160** for comparison to subsequent images captured by the capture device **155**.

[0071] FIGS. **8**A-**8**D show the firearm optics positioning assembly **149** or the red dot positioning assembly **150** of FIG. **7** in different arrangements as may be adapted for integration into various known red dot optics. As shown in FIGS. **8**A-**8**D, known red dot optics **152** are varied in design configuration, size, and attachment options including a mounting plate **166** and a riser **167**. Accordingly, the integration of the red dot positioning assembly **150** into a known red dot optics depends on various factors. For example, known red dot optics **152** utilize an internal power source to generate an optical beam that forms the red dot **175**. With integration of the red dot positioning assembly **150**, a power source **116** may be utilized to power the red dot positioning assembly **150**. Alternatively, the internal power source of the red dot optic **152** may be configured to power the red dot optic **152** and the red dot positioning assembly **150**.

[0072] FIG. **8**A shows the vision capture device **155** integrated into a red dot optic **152** to capture a field of view **156**. FIG. **8**A further shows the storage device **160**, processor **162**, recognition circuit **163**, and processor elements **164** as may be integrated into the housing of the red dot optic **152** (FIG. **8**B), the mounting plate **166** (FIG. **8**A and **8**C), or the riser **167** (FIG. **8**D) of the red dot optic **152**. FIG. **8**B shows another red dot optic **152** with integration of the vision capture device **155** and one example of the cue **157** formed as an LED band along an upper edge of the red dot optic **152**. In this regard, the cue **157** acts as a perceptible visual signal to affirm the red dot **175** is positioned on the target **180**.

[0073] FIG. **9** shows a combination firearm optics positioning assembly **149** or red dot positioning assembly **150** and touchless sensor firing control assembly **110** operatively connected in a touchless firearm firing control system **2** in accordance with an embodiment of the present invention. The electromechanical connections **170** have been removed from FIG. **8** for clarity. The combined elements of the red dot positioning assembly **150** and the touchless firearm firing control assembly **110** operate generally as described with reference to FIG. **7** and FIG. **3** respectively, however a logic AND gate **165** is included and a multi-position power switch **128** replaces power switches **125** and **126**.

[0074] Once first images are stored for later comparison to intended targets, red dot positioning assembly **150** operates in combination with sensor assembly **110** such that two conditions must be met for the actuation voltage to be sent to load **130**. More specifically, load **130** is configured to receive an actuation voltage from power source **116** only upon both: i) detection of a second image of a field of view by the red dot positioning assembly **150** and determination that the second image is substantially the same as one of the first images; and ii) detection of movement by touchless sensor **115**.

[0075] This may be accomplished using an AND gate **165**, with two inputs (shown as inputs A and B) and a single output (shown as output Y). In AND gate **165**, if either of the inputs A or B is low (0), then the output Y is also low. In other words, both inputs A and B must be high (1) for output Y to be high.

[0076] Input A receives a high input (1) from storage device **160** only when a second image of viewing field **156** appearing in red dot optic **152** substantially matches one of first images stored in storage device **160**. Input B receives a high input (1) from sensor **115** when sensor **115** senses object movement, as previously described herein.

[0077] The output Y (voltage) of AND gate **165** is sent to and received by load **130**. As described herein, that voltage will be high only if both inputs A and B are high, or in other words, only if: i) detection of a second image of a field of view **156** by the red dot positioning assembly **150** and determination that the second image is substantially the same as one of the first images; and ii) detection of movement by touchless sensor **115**.

[0078] Accordingly, when the red dot **175** is positioned on a target **180** substantially matching one of the first captured images, and sensor **115** detects an object **190**, the firearm **5** will fire. In this regard, the combination of red dot positioning assembly **150** and touchless sensor firing control assembly **110** provides an enhanced level of shooting consistency and accuracy.

[0079] FIG. **10** shows a multi-position switch **128** and a circuit configuration of the firearm optics positioning assembly **149** or the red dot positioning assembly **150** and the touchless sensor firing control assembly **110** combination shown in FIG. **8** in accordance with an embodiment of the present invention. The electro-mechanical connectivity connections include: an output Y of logic AND gate **165**, the load **130**, the power source **116** and the multi-position power switch **128**; and the power source **116**, the capture device **155**, storage device **160**, processor **162**, processor elements **164**, and recognition circuit **163**. Additional connections include input A of the logic AND gate **165** from sensor **115**, and input B of the logic AND gate **165** from the red dot positioning assembly **150**. In the example shown in FIG. **9**, the power source **116** supplies power directly to the sensor **115**, and to the red dot positioning assembly **150** through the multi-position power switch **128**. Depending on the intended operational applications, size limitations, and other considerations various circuit configurations may be employed.

[0080] In the embodiment shown in FIG. **9**, multi-position power switch **128** is a four-position switch that offers separate and distinct selective activation and deactivation of the firing control assembly **110** and/or the firearm optics positioning assembly **149** or the red dot positioning assembly **150**. With power switch **128** placed in a first position **177-1**, no connections are made through the power switch **128** for either the firing control assembly **110** or the red dot positioning assembly **150**. Accordingly, the firearm **5** may be operated in the traditional manner by pulling the trigger **50** and utilizing the back-up iron sights. With power switch **128** placed in a second position **177-2**, the firing control assembly **110** is activated and detection of an object **190** by sensor **115** will provide an actuation voltage to load **130** causing directional movement of the load **130** connected to the trigger bar **45** resulting in firing of the firearm. Accordingly, with power switch in the second position **177-2**, the fireman **5** may be operated as described with reference to FIG. **3**. With power switch **128** placed in a third position **177-3**, the red dot positioning assembly **150** is activated and the red dot positioning assembly **150** operates to capture, store, process, and recognize field of view **156** to provide a cue as described with reference to FIG. **7**. With power switch **128** in a fourth position **177-4**, the firing control assembly **110** and the red dot positioning assembly **150** are activated and the combination of firing control assembly **110** and red dot positioning assembly **150** are used together and operate as described with reference to FIG. **8** to provide inputs to the logic AND gate **165**, such that logic AND gate **165** outputs output Y to load **130**.

[0081] The four positions of the multi-position power switch **128** and the corresponding activation of related elements has no effect on the operation of those assembly elements that are deactivated. Power switch **128** thus acts as a safety switch in that while activation of only the red dot positioning assembly **150** may enhance shooting consistency and accuracy, activation of the red dot positioning assembly **150** alone with power switch **128** in the third position **177-3** will not cause firing of the firearm **5** unless the trigger **50** is pulled in the traditional manner. In summary, the firing control assembly **110** and the red dot positioning assembly **150** may be used together or separately to adapt to a variety of shooting needs or other requirements while enhancing shooting consistency and accuracy.

[0082] The apparatus and methods of the claimed subject matter have been described with some particularity, but the specific designs, constructions and steps disclosed are not to be taken as delimiting of the subject matter. Obvious modifications will make themselves apparent to those of ordinary skill in the art, all of which will not depart from the essence of the claimed subject matter and all such changes and modifications are intended to be encompassed within the appended claims.

Claims

1. A firearm optics positioning assembly configured to capture multiple images of a field of view of a firearm optic including a first image and generate a perceptible signal upon detection of a second image of the field of view being substantially the same as the first image.

2. The assembly of claim 1, comprising: a power source, a visual capture device, a storage device,

and a recognition circuit operatively connected to each other, wherein the capture device captures and transmits the first image to the storage device; the recognition circuit compares the first image to subsequent images captured by the capture device; and the perceptible signal is generated upon detection of the second image being substantially the same as the first image.
3. The assembly of claim 2, further comprising: a processor and processing elements operatively connected, wherein the processor maps a fixed field of pixel locations corresponding to the first image using program instructions for directing one or more of the processing elements; and the fixed field of pixel locations is communicated and stored in the storage device for comparison to subsequent images captured by the capture device.
4. The assembly of claim 1, wherein the firearm optic is a scope, a red dot sight, a reflex sight, a prism sight, a low-powered variable optic, or a holographic sight.
5. The assembly of claim 2, where in the visual capture device is a camera.
6. The assembly of claim 5, wherein the firearm optic is a scope, a red dot sight, a reflex sight, a prism sight, a low-powered variable optic, or a holographic sight.
7. The assembly of claim 1, further comprising: a touchless sensor firing control assembly comprising: a touchless sensor; the power source; and a load electrically connected to the sensor and configured to be actuated by an actuation voltage from the power source upon detection of object movement by the sensor, wherein the firearm optics positioning assembly and the touchless sensor firing control assembly are connected to a firearm, and wherein the load is mechanically connected to a trigger assembly of the firearm; and wherein the load is configured to receive an actuation voltage from the power source only upon both: i) detection of a second image of a field of view by the firearm optics positioning assembly and determination that the second image is substantially the same as the first image; and ii) detection of movement by the touchless sensor to cause actuation of the firing pin of the firearm in response thereto.
8. The assembly of claim 1, further comprising: touchless firing control system comprising; a touchless sensor firing control assembly, wherein the firearm optics positioning assembly and the touchless sensor firing control assembly are connected to a firearm, and wherein a load is mechanically connected to a trigger assembly of the firearm; and wherein the load is configured to receive an actuation voltage from a power source to cause actuation of the firing pin of the firearm in response thereto upon both: i) detection of a second image of a field of view by the firearm optics positioning assembly and determination that the second image is substantially the same as the first image; and ii) detection of movement by a touchless sensor of the touchless firing control system.
9. A firearm optics positioning assembly configured to capture multiple images of a field of view of a red dot optic including a first image of a field of view and generate a cue upon determination that a second image of a field of view of the red dot optic is substantially the same as the first image.
10. The assembly of claim 9, comprising: a power source, a vision capture device, a storage device, a recognition circuit operatively connected to each other, wherein the vision capture device is configured to capture the first image; the storage device is configured to store the first image; the recognition circuit compares the first image to subsequent images captured by the capture device and upon determination that the second image is substantially the same as the first image the cue is generated.
11. The assembly of claim 10, further comprises a processor and processing elements operatively connected, wherein the processor maps a fixed field of pixel locations corresponding to the first image using program instructions for directing one or more processing elements; and the fixed field of pixel locations is communicated and stored in the storage device for comparison to subsequent images captured by the capture device.
13. The assembly of claim 10, where in the visual capture device is a camera.
14. The assembly of claim 9, further comprising: a touchless sensor firing control assembly comprising: a touchless sensor; the power source; and a load electrically connected to the sensor

and configured to be actuated by an actuation voltage from the power source upon detection of object movement by the sensor, wherein the wherein the firearm optics positioning assembly and the touchless sensor firing control assembly are connected to a firearm, and wherein the load is mechanically connected to a trigger assembly of the firearm; and wherein the load is configured to receive an actuation voltage from the power source only upon both: i) detection of a second image of a field of view by the red dot positioning assembly and determination that the second image is substantially the same as the first image; and ii) detection of movement by the touchless sensor to cause actuation of the firing pin of the firearm in response thereto.

15. The assembly of claim 9, further comprising: touchless firing control system comprising; a touchless sensor firing control assembly, wherein the firearm optics positioning assembly and the touchless sensor firing control assembly are connected to a firearm, and wherein a load is mechanically connected to a trigger assembly of the firearm; and wherein the load is configured to receive an actuation voltage from a power source to cause actuation of the firing pin of the firearm in response thereto upon both: i) detection of a second image of a field of view by the firearm optics positioning assembly and determination that the second image is substantially the same as the first image; and ii) detection of movement by a touchless sensor of the touchless firing control system.