CLAIMS

1. A firearm aiming system comprising:

an imaging system comprising an imaging sensor and an image processor; and

a user display,

wherein the imaging system is adapted to detect at least one potential target based on target features and to display, on the user display, an indicator of a direction in which the firearm is pointed; the system further comprising:

user controls for locking on a detected potential target towards which the firearm is pointed according to the indicator.

2. The system according to claim 1, wherein the imaging system adapted to use at least one background feature for determining target movement and/or proper aim point.

3. The system according to claim 2, wherein the at least one background feature includes a static background feature.

4. The system according to claim 1, wherein the user controls are adapted to allow locking on the potential target automatically.

5. The system according to claim 1, wherein the user controls are adapted to allow locking on the potential target manually.

6. The system according to claim 1, wherein the user controls include a target lock-on mechanism consisting of one of the elements selected from the group comprising: a trigger, a button, a touch screen.

7. The system according to claim 1, adapted to allow locking onto a plurality of targets.

8. The system according to claim 1, wherein the imaging system detects the target on the basis of edge detection.

9. The system according to claim 1, wherein the detection is highlighted in the form of a contour at the edges of the target or a potion of the target or in the form of coloration.

10. The system according to claim 1, wherein imaging system is adapted so that the target features may include any of the features, including a combination thereof, chosen from the group consisting of: target movement, target shape, associated enemy muzzle flash, range/distance, IR signature, and "change detection".

11. The system according to claim 1, further comprising a firing processor for predicting/determining if a target will be hit.

12. The system according to claim 11, wherein the firing processor is adapted to calculate a lead required for proper aim point.

13. The system according to claim 11, further comprising an epsilon logic module for calculating a target aim-point/area used by the firing processor to make a firing decision.

14. The system according to claim 13, wherein the epsilon logic module is adapted for calculating dynamic epsilon area.

15. The system according to claim 14, wherein the epsilon logic module includes an algorithm to take into account target, firearm and environmental factors.

16. The system according to claim 11, further comprising a firing actuator adapted to enable firing only when the firing processor determines the target will be hit.

17. The system according to claim 11, wherein the firing actuator is an actuation mechanism for actuating a trigger or a hammer of the firearm.

18. The system according to claim 17, wherein the actuation mechanism is adapted to release the trigger or the hammer of the firearm.

19 .The system according to claim 17, wherein the actuation mechanism is adapted to actively move the trigger or the hammer of the firearm.

20. The system according to claim 1, further comprising a target tracker processor for tracking potential targets.

21. The system according to claim 1, wherein the image processor includes a target recognition algorithm for identifying the target type.

22. The system according to claim 1, further having a non-lock on mode.

23. The system according to claim 1, further having a "suppressing fire"mode.

24. The system according to claim 1, adapted to be activated by a partial depress of the trigger.

25. The system according to claim1, wherein the aiming system is adapted to allow operation as a "regular" firearm, able to shoot mechanically.

26. A method of operating a firearm having a display, the firearm comprising:
pointing the firearm at a target;
selecting a target area towards which the firearm is pointing by locking on a location of the target area resulting in the firearm locking onto a desired hit point and tracking the selected target; and
aiming the firearm in a direction of the target until the firearm has determined the target will be hit.

27. The method according to claim 26, wherein aiming the firearm includes aiming within an epsilon tolerance of the selected range.

28. The method according to claim 26, wherein aiming the firearm includes using an aiming guide line/arrow.

29. The method according to claim 26, wherein locking onto the target comprises partially depressing a trigger of the firearm.

30. The method according to claim 26, wherein locking onto the desired hit point includes locking on a particular part of the selected target or the center of the selected target.

31. The method according to claim 26, wherein locking onto the desired hitpoint includes locking on a particular location of the target.

32. The method according to claim 26, wherein the selecting of the target area includes using object background segregation by the imaging system of the firearm, the method further comprising:
selecting the target automatically or based on a user command in order to track the target;
predicting movement of the target, if any; and thus the position, of the target with respect to background features of the field of view;
predicting the aiming of the firearm using background features of the field of view; and
enabling firing at the target when the predicted aim of the firearm coincides with the predicted position of the target.

33. The method according to claim 32, wherein using object background segregation includes using movement detection.

34. The method according to claim 32, further using target range estimation based on background features in the field of view.

35. The method according to claims 32, further using target range estimation based on comparison to objects of familiar size.

36. The method according to claim 32, further using target range estimation based on target size changing.

37. The method according to claim 36, wherein target range estimation includes using perspective analysis.

38. The method according to claim 36, wherein target range estimation includes using focus for estimating the range.

CLAIMS

1. A firearm aiming system comprising:

an imaging system (12) comprising an imaging sensor (22) and an image processor (24), wherein the imaging system (12) is adapted to detect at least one potential target in a field of view "FOV" of the imaging system (12) based on automatically detected target features in the FOV;

a user display (14), wherein the imaging system (12) is adapted to highlight on said user display said at least one potential target;

user controls (16) for locking on a selected target which results in the firearm aiming system locking on to an aim-point or area on the selected target;

a firing processor (18) for predicting/determining if the selected target will be hit wherein said firing processor (18) has:

a firing computer (26) adapted to perform activities such as: calculating an adjusted aim-point to a required range, wind, and inclining angle,

characterised in that said firing processor further has an epsilon logic module (28) adapted to dynamically calculate an allowed area for firing around the aim-point or area of the selected target, and

a firing decision module (30), adapted to use input from said imaging system (12), said firing computer (26) and said epsilon logic module (28) to determine if the selected target is expected to be hit, and thus whether to fire;

and wherein a target of said detected at least one potential target, visible in said user display (14), is adapted to be selected when the firearm is pointed at the target or a target lockable area which is larger than an actual area of the target.

2. The system according to claim 1, wherein the imaging system (12) adapted to use at least one background feature for determining target movement and/or proper aim point.

3. The system according to claim 1, further adapted to allow locking onto a plurality of targets.

4. The system according to claim 1, further having a "suppressing fire" mode which is a modified non-lock on mode that allows firing every predetermined time period if a trigger of the firearm is pressed, even if no target or movement is identified.

5. The system according to claim 1, wherein the detection is highlighted in the form of a contour at the edges of the target or a portion of the target or in the form of coloration.

6. The system according to claim 1, wherein imaging system (12) is adapted so that the target features may include any of the features, including a combination thereof, chosen from the group consisting of: target movement, target shape, associated enemy muzzle flash, range/distance, IR signature, and “change detection” whereby a current record of a scene is compared to a recorded database of said scene.

7. The system according to claim 1, wherein the epsilon logic module (28) is configured for dynamically calculating a shape and size of an epsilon area around the target aim-point/area.

8. The system according to claim 7, wherein the epsilon logic module (28) includes an algorithm to take into account at least one of: a target, the firearm and environmental factors.

9. The system according to claim 1, wherein the image processor (24) includes a target recognition algorithm for identifying the target type.

10. The system according to claim 1, further having a non-lock on mode.

11. A method of operating a firearm, the method comprising:

providing a firearm aiming system (11) on the firearm including:

an imaging system (12) comprising an imaging sensor (22) and an image processor (24), wherein the imaging system (12) is adapted to detect at least one potential target in a field of view “FOV” of the imaging system (12) based on automatically detected target features in the FOV;

a user display (14), wherein the imaging system (12) is adapted to highlight on said user display said at least one potential target;

user controls (16) for locking on a selected target which results in the firearm aiming system locking on to an aim-point or area on the selected target;

a firing processor (18) for predicting/determining if the selected target will be hit wherein said firing processor (18) has:

a firing computer (26) adapted to perform activities such as: calculating an adjusted aim-point to a required range, wind and inclining angle, and

an epsilon logic module (28) adapted to dynamically calculate an allowed area for firing around the aim-point or area of the selected target and

a firing decision module (30) adapted to use input from said imaging system (12), said firing computer (26) and said epsilon logic module (28) to determine if the selected target is expected to be hit, and thus whether to fire;

tracking at least one target;

pointing the firearm (10) at one of said at least one target or at a target lockable area which is larger than an actual area of the target to enable highlighting, in real time, of the target, whereby the target is highlighted on the user display (14) of the firearm aiming system (11) to produce a highlighted target area;

selecting the highlighted target area towards which the firearm (10) is pointing resulting in the firearm aiming system (11) locking onto a selectably predetermined hit area on the selected target; and

aiming the firearm (10) in a direction of the target until the firearm aiming system (11) has determined the target will be hit.

12. The method according to claim 11, further using image processing techniques for passively estimating target range.

13. The method according to claim 11, wherein aiming the firearm (10) includes aiming within a dynamic epsilon tolerance of the selected target, which is calculated by taking into account at least one of: a target, the firearm (10) and environmental factors.

14. The method according to claim 11, wherein locking onto the hit point includes locking on the center of the selected target, or locking on a chosen or predetermined location of the selected target.

15. The method according to claim 11, the method further comprising:

detecting, automatically, a target within a field of view using object background segregation by the imaging system of the firearm aiming system (11);

predicting movement of the target, if any; and thus the position, of the target with respect to background features of the field of view;

predicting the aiming of the firearm (10) using background features of the field of view; and

enabling firing at the target when the predicted aim of the firearm (10) coincides with the predicted position of the target.