

CLAIMS:

1. A system for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner, the system comprising:

the active 3D scanner, comprising:

- 5 a scanning mechanism configured to scan the FOV;
 at least one energy emitting source configured to emit energy pulses, in
synchronization with the scanning mechanism, to cover the FOV; and
 the at least one detector; and
processing circuitry configured to:
- 10 obtain mapping designation information, the mapping designation information
being independent of past readings obtained by the at least one detector, if any;
 selectively activate the at least one energy emitting source to emit only a
subset of the energy pulses, in accordance with the mapping designation information
and in synchronization with the scanning mechanism, to cover the part of the FOV;
- 15 obtain current readings, from the at least one detector, based on reflections of
the subset of the energy pulses; and
 generate the 3D map based on the current readings.

2. The system of claim 1, wherein the mapping designation information includes a
20 designation of the part of the FOV or a second part of the FOV that is not the part of the
FOV.

3. The system of claim 2, wherein the mapping designation information includes one or
more of: designation of a pixel resolution of the 3D map for one or more regions within the
25 part of the FOV, or a designation of energy levels of one or more first energy pulses of the
subset of the energy pulses.

4. The system of claim 1, wherein at least some of the mapping designation information
is obtained from a user of the system.

5. The system of claim 4, wherein the at least some of the mapping designation information is obtained from a tracker that tracks a line-of-sight between the user and a region within the part of the FOV.

5 6. The system of claim 1, wherein at least some of the mapping designation information is based on a geolocation of one or more objects within the FOV.

7. The system of claim 6, wherein the geolocation of at least one of the objects is stored in a geographical database.

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8. The system of claim 1, wherein at least some of the mapping designation information is based on one or more of: a terrain elevation map, or a decoded image that includes the part of the FOV.

15 9. The system of claim 1, wherein the at least one energy emitting source is selectively activated, at least in part, to conserve energy resources of the system.

10. The system of claim 1, wherein at least some of the mapping designation information is associated with one or more fixed coordinate areas within the FOV having fixed
20 coordinates in a fixed coordinate system established in space and wherein the processing circuitry is further configured to:

upon identifying a change in at least one of a position or an orientation of the at least one detector relative to the fixed coordinate areas, update the at least some of the mapping designation information based on the change.

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11. The system of claim 1, wherein at least some of the mapping designation information is associated with one or more fixed coordinate areas within the FOV having fixed coordinates in a fixed coordinate system established in space and wherein the active 3D scanner is gimbaled to a platform by a gimbal, and wherein the processing circuitry is further
5 configured to:

upon identifying a change in a first orientation of the platform relative to the fixed coordinate areas, provide a control signal for rotating the active 3D scanner along the gimbal to maintain a second orientation of the at least one detector relative to the fixed coordinate areas notwithstanding the change in the first orientation of the platform relative to the fixed
10 coordinate areas.

12. The system of claim 1, wherein at least some of the mapping designation information is associated with one or more moving objects within the FOV and wherein the processing circuitry is further configured to:

15 upon identifying a change in at least one of a position or an orientation of the at least one detector relative to the moving objects, update the at least some of the mapping designation information based on the change.

13. The system of claim 1, wherein at least some of the mapping designation information
20 is associated with one or more moving objects within the FOV and wherein the active 3D scanner is gimbaled to a platform by a gimbal, and wherein the processing circuitry is further configured to:

upon identifying a change in a first orientation of the platform relative to the moving objects, provide a control signal for rotating the active 3D scanner along the gimbal to
25 maintain a second orientation of the at least one detector relative to the moving objects notwithstanding the change in the first orientation of the platform relative to the moving objects.

14. The system of claim 1, wherein the active 3D scanner is mounted on a platform, and
30 wherein at least some of the mapping designation information is generated to reduce an exposure of the platform to sensors that are capable of detecting the energy pulses.

15. The system of claim 1, wherein the active 3D scanner is mounted on a platform, and wherein at least some of the mapping designation information is generated to reduce temporary blinding of sensors on the platform or external to the platform.

5 16. The system of claim 1, wherein the active 3D scanner is mounted on an airborne platform, and wherein, during a landing approach for landing the airborne platform at a selected landing area, the part of the FOV is associated with one or more of: the selected landing area or a path to the selected landing area.

10 17. The system of claim 1, wherein the active 3D scanner is mounted on an airborne platform, and wherein, during flight of the airborne platform along a flight path, the part of the FOV is associated with one or more flight paths pre-approved for flying the airborne platform.

15 18. The system of claim 1, wherein the processing circuitry is further configured to:
 obtain targeting designation information that designates one or more designated targets; and
 activate the at least one energy emitting source to emit one or more targeting energy pulses towards the designated targets.

20 19. The system of claim 18, wherein the targeting designation information is obtained from a user of the system.

20. The system of claim 19, wherein the targeting designation information is obtained
25 from a tracker that tracks a line-of-sight between the user and the designated targets.

21. The system of claim 1, wherein the at least one energy emitting source is a Light Detection and Ranging (LiDAR), and wherein the energy pulses are laser pulses.

30 22. The system of claim 1, wherein the at least one energy emitting source is a radar, and wherein the energy pulses are radio pulses.

23. The system of claim 22, wherein the radar is a frequency-modulated continuous-wave (FMCW) radar.

24. A system for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner mounted on a moving platform, the system comprising:

the active 3D scanner, comprising:

a scanning mechanism configured to scan the FOV;

at least one energy emitting source configured to emit energy pulses, in synchronization with the scanning mechanism, to cover the FOV; and

the at least one detector; and

processing circuitry configured to:

provide a pre-loaded 3D model of a mission area, pre-loaded prior to performing a mission by the moving platform;

obtain a current location of the moving platform;

determine mapping designation information based on the 3D model, the current location and one or more mapping designation rules;

selectively activate the at least one energy emitting source in synchronization with the scanning mechanism to emit only a subset of the energy pulses to cover the part of the FOV, in accordance with the mapping designation information;

obtain current readings, from the at least one detector, based on reflections of the subset of the energy pulses; and

generate the 3D map based on the current readings.

25. A method for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner, the method comprising:

obtaining mapping designation information, the mapping designation information being independent of past readings obtained by the at least one detector, if any;

5 selectively activating at least one energy emitting source of the active 3D scanner to emit a first number of energy pulses, in accordance with the mapping designation information and in synchronization with a scanning mechanism of the active 3D scanner, to cover the part of the FOV, wherein the scanning mechanism is configured to scan the FOV, and wherein the at least one energy emitting source is configured to emit a second number of energy pulses, in
10 synchronization with the scanning mechanism, to cover the FOV, the second number of energy pulses being greater than the first number of energy pulses;

obtaining current readings, from at least one detector of the active 3D scanner, based on reflections of the first number of energy pulses; and

generating the 3D map based on the current readings.

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26. The method of claim 25, wherein the mapping designation information includes a designation of the part of the FOV or a second part of the FOV that is not the part of the FOV.

20 27. The method of claim 26, wherein the mapping designation information includes one or more of: a designation of pixel resolutions of the 3D map for one or more regions within the part of the FOV, or a designation of energy levels of one or more first energy pulses of the first number of energy pulses.

25 28. The method of claim 25, wherein at least some of the mapping designation information is obtained from a user of the active 3D scanner.

29. The method of claim 28, wherein the at least some of the mapping designation information is obtained from a tracker that tracks a line-of-sight between the user and a
30 region within the part of the FOV.

30. The method of claim 25, wherein at least some of the mapping designation information is based on a geolocation of one or more objects within the FOV.

31. The method of claim 30, wherein the geolocation of at least one of the objects is stored in a geographical database.

5 32. The method of claim 25, wherein at least some of the mapping designation information is based on one or more of: a terrain elevation map, or a decoded image that includes the part of the FOV.

33. The method of claim 25, wherein the at least one energy emitting source is selectively
10 activated, at least in part, to conserve energy resources of the active 3D scanner.

34. The method of claim 25, wherein at least some of the mapping designation information is associated with one or more fixed coordinate areas within the FOV having fixed coordinates in a fixed coordinate system established in space, and wherein the method
15 further comprises:

 upon identifying a change in at least one of a position or an orientation of the at least one detector relative to the fixed coordinate areas, updating the at least some of the mapping designation information based on the change.

20 35. The method of claim 25, wherein at least some of the mapping designation information is associated with one or more fixed coordinate areas within the FOV having fixed coordinates in a fixed coordinate system established in space, wherein the active 3D scanner is gimbaled to a platform by a gimbal, and wherein the method further comprises:

 upon identifying a change in a first orientation of the platform relative to the fixed
25 coordinate areas, providing a control signal for rotating the active 3D scanner along the gimbal to maintain a second orientation of the at least one detector relative to the fixed coordinate areas notwithstanding the change in the first orientation of the platform relative to the fixed coordinate areas.

36. The method of claim 25, wherein at least some of the mapping designation information is associated with one or more moving objects within the FOV, and wherein the method further comprises:

upon identifying a change in at least one of a position or an orientation of the at least one detector relative to the moving objects, updating the at least some of the mapping designation information based on the change.

37. The method of claim 25, wherein at least some of the mapping designation information is associated with one or more moving objects within the FOV, wherein the active 3D scanner is gimbaled to a platform by a gimbal, and wherein the method further comprises:

upon identifying a change in a first orientation of the platform relative to the moving objects, providing a control signal for rotating the active 3D scanner along the gimbal to maintain a second orientation of the at least one detector relative to the moving objects notwithstanding the change in the first orientation of the platform relative to the moving objects.

38. The method of claim 25, wherein the active 3D scanner is mounted on a platform, and wherein at least some of the mapping designation information is generated to reduce an exposure of the platform to sensors that are capable of detecting the energy pulses.

39. The method of claim 25, wherein the active 3D scanner is mounted on a platform, and wherein at least some of the mapping designation information is generated to reduce temporary blinding of sensors on the platform or external to the platform.

40. The method of claim 25, wherein the active 3D scanner is mounted on an airborne platform, and wherein, during a landing approach for landing the airborne platform at a selected landing area, the part of the FOV is associated with one or more of: the selected landing area or a path to the selected landing area.

41. The method of claim 25, wherein the active 3D scanner is mounted on an airborne platform, and wherein, during flight of the airborne platform along a flight path, the part of the FOV is associated with one or more flight paths pre-approved for flying the airborne platform.

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42. The method of claim 25, further comprising:

obtaining targeting designation information that designates one or more designated targets; and

activating the at least one energy emitting source to emit one or more targeting energy
10 pulses towards the designated targets.

43. The method of claim 42, wherein the targeting designation information is obtained from a user of the active 3D scanner.

15 44. The method of claim 43, wherein the targeting designation information is obtained from a tracker that tracks a line-of-sight between the user and the designated targets.

45. The method of claim 25, wherein the at least one energy emitting source is a Light Detection and Ranging (LiDAR), and wherein the energy pulses are laser pulses.

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46. The method of claim 25, wherein the at least one energy emitting source is a radar, and wherein the energy pulses are radio pulses.

47. The method of claim 46, wherein the radar is a frequency-modulated continuous-wave
25 (FMCW) radar.

48. A method for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner mounted on a moving platform, the method comprising:

- 5 providing a pre-loaded 3D model of a mission area, pre-loaded prior to performing a mission by the moving platform;
- obtaining a current location of the moving platform;
- determining mapping designation information based on the 3D model, the current location and one or more mapping designation rules;
- 10 selectively activating at least one energy emitting source of the active 3D scanner to emit a first number of energy pulses, in accordance with the mapping designation information and in synchronization with a scanning mechanism of the active 3D scanner, to cover the part of the FOV, wherein the scanning mechanism is configured to scan the FOV, and wherein the at least one energy emitting source is configured to emit a second number of energy pulses, in synchronization with the scanning mechanism, to cover the FOV, the second number of
- 15 energy pulses being greater than the first number of energy pulses;
- obtaining current readings, from at least one detector, based on reflections of the first number of energy pulses; and
- generating the 3D map based on the current readings.

49. A non-transitory computer readable storage medium having computer readable program code embodied therewith, the computer readable program code, executable by processing circuitry of a computer to perform a method for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner,
- 5 the method comprising:
- obtaining mapping designation information, the mapping designation information being independent of past readings obtained by the at least one detector, if any;
 - selectively activating at least one energy emitting source of the active 3D scanner to emit a first number of energy pulses, in accordance with the mapping designation information
 - 10 and in synchronization with a scanning mechanism of the active 3D scanner, to cover the part of the FOV, wherein the scanning mechanism is configured to scan the FOV, and wherein the at least one energy emitting source is configured to emit a second number of energy pulses, in synchronization with the scanning mechanism, to cover the FOV, the second number of energy pulses being greater than the first number of energy pulses;
 - 15 obtaining current readings, from at least one detector of the active 3D scanner, based on reflections of the first number of energy pulses; and
 - generating the 3D map based on the current readings.

50. A non-transitory computer readable storage medium having computer readable program code embodied therewith, the computer readable program code, executable by processing circuitry of a computer to perform a method for generating a three-dimensional (3D) map of part of a field-of-view (FOV) of at least one detector of an active 3D scanner
- 5 mounted on a moving platform, the method comprising:
- providing a pre-loaded 3D model of a mission area, pre-loaded prior to performing a mission by the moving platform;
 - obtaining a current location of the moving platform;
 - determining mapping designation information based on the 3D model, the current
 - 10 location and one or more mapping designation rules;
 - selectively activating at least one energy emitting source of the active 3D scanner to emit a first number of energy pulses, in accordance with the mapping designation information and in synchronization with a scanning mechanism of the active 3D scanner, to cover the part of the FOV, wherein the scanning mechanism is configured to scan the FOV, and wherein the
 - 15 at least one energy emitting source is configured to emit a second number of energy pulses, in synchronization with the scanning mechanism, to cover the FOV, the second number of energy pulses being greater than the first number of energy pulses;
 - obtaining current readings, from at least one detector, based on reflections of the first number of energy pulses; and
 - 20 generating the 3D map based on the current readings.