CLAIMS

1. A method of navigating an unmanned ground vehicle (UGV), the vehicle comprising a scanning device and an Inertial Navigation System (INS) being operatively connected to at least one processor, the method comprising:

operating the scanning device for repeatedly executing a scanning operation, wherein each scanning operation includes scanning an area surrounding the UGV, to thereby generate respective scanning output data;

operating the processor for generating, based on the scanning output data from a plurality of scanning operations, a map representing at least a part of the area, the map being relative to a location of the UGV and is characterized by a certain size, wherein the map comprises cells, each cell is classified to a class selected from at least two classes, comprising traversable and non-traversable, and characterized by dimensions equal to or larger than an accumulated drift value of the INS over a predefined distance; wherein non-traversable cells correspond to obstacles;

receiving INS data indicative of a current location of the UGV relative to a previous location; and

updating a location of the UGV relative to cells in the map based on the INS data.

2. The method of Claim 1, further comprising controlling movement of the UGV within the area based on the map, to thereby avoid non-traversable cells.

3. The method of any one of the preceding Claims, wherein the map is generated by accumulating scanning output data to map the area as the UGV advances into the area.

4. The method of any one of the preceding Claims , wherein the map is generated by accumulating scanning output data in an advancement direction of the UGV as the UGV advances into the area, and omitting representation of areas in an opposite direction beyond a scanning range.

5. The method of any one of the preceding Claims , further comprising:

obtaining a path to a destination of the UGV; and

updating the path using the map so as to avoid non-traversable cells.

6. The method of Claim5, further comprising receiving a current location of the UGV and a destination location in absolute coordinates, and determining the path based on the current location and the destination location.

7. The method of Claim 6, further comprising identifying the destination location based on a predetermined mark, and wherein the path is determined from a current location to the destination location.

8. The method of Claim 5, further comprising providing steering instructions to control the UGV in accordance with the path.

9. The method of Claim 5, further comprising displaying a representation of the map including non-traversable cells, an indication of a location of the UGV and the path.

10. The method of any one of the preceding Claims , wherein the predefined distance equals any one of:

a. a maximal distance expected to be travelled by the UGV between consecutive map updates;

b. a dimension of the area represented by the map;

c. half of a dimension of the part of the area represented by the map.

11. The method of any one of Claims 1 to 9, wherein the predefined distance is determined in accordance with a relation between an update rate of the map, and a maximal or expected velocity of the UGV.

12. The method of any one of the preceding Claims, wherein the area is a square having an edge of up to double the scanning distance of the scanning device.

13. The method of any one of the preceding claims, wherein the area has predefined area dimensions.

14. The method of Claim 13, wherein an obstacle detected during a first scanning operation is indicated on the map as a non-traversable cell, and wherein a non-traversable cell representing an obstacle that is detected in the first scanning operation

and is not detected in at least one subsequent scanning operation is indicated on at least one further map update.

15. The method of any one of the preceding Claims, wherein a dimension of each cell is determined in accordance with the dimension of the area squared, divided by a velocity of the UGV and multiplied by the drift value of the INS.

16. An unmanned ground vehicle (UGV), comprising:

a scanning device configured to repeatedly execute a scanning operation, wherein each scanning operation includes scanning an area surrounding the UGV, to thereby provide scanning output data that includes information about distances between objects in the area and the UGV in a multiplicity of directions;

an INS for providing data indicative of a current location of the UGV relative to a previous location;

a vehicle control sub-system configured to receive vehicle control instructions and control the UGV in accordance with the instructions; and

at least one processor configured to:

generate, based on scanning the output data from a plurality of scanning operations, a map representing at least a part of the area, the map being relative to a location of the UGV, wherein the map comprises cells, each cell is classified to a class selected from the group consisting of traversable and non-traversable, and characterized by dimensions equal to or larger than an accumulated drift value of the INS over a predefined distance; wherein non-traversable cells correspond to obstacles;

receive INS data indicative of a current location of the UGV relative to a previous location; and

update a location of the UGV relative to the cells based on the INS data; and

control the vehicle within the area based on the map, while avoiding non-traversable cells.

17. A system mountable on an unmanned ground vehicle (UGV), comprising:

a scanning device configured for repeatedly executing a scanning operation, wherein each scanning operation includes scanning an area surrounding the UGV, to thereby provide scanning output data providing information about distances between objects in the area and the UGV in a multiplicity of directions;

an INS for providing data indicative of a current location of the UGV relative to a previous location; and at least one processor configured to:

generate, based on the scanning output data from a plurality of scanning operations, a map representing at least a part of the area, the map being relative to a location of the UGV, wherein the map comprises cells, each cell is classified to a class selected from the group consisting of traversable and non-traversable, and characterized by dimensions larger than an accumulated drift value of the INS over a predefined distance; wherein non-traversable cells correspond to obstacles;

receive INS data indicative of a current location of the UGV relative to a previous location; and

update a location of the UGV relative to the cells based on the INS data.

18. The system of Claim 17, wherein the processor is further configured to control UGV movement within the area based on the map, to thereby avoid non-traversable cells.

19. The system of any one of Claims 17 to 18, wherein the processor is configured to generate the map by accumulating scanning output data to map the area as the UGV advances into the area.

20. The system of any one of Claims 17 to 19, wherein the processor is configured to generate the map by accumulating scanning output data in an advancement direction of the UGV as the UGV advances into the area, and omit representation of areas in an opposite direction beyond a scanning range.

21. The system of any one of Claims 17 to 20, wherein the processor is further configured to:

obtain a path to a destination of the UGV; and

update the path using the map so as to avoid non-traversable cells.

22. The system of Claim 21, wherein the processor is further configured to receive a current location of the UGV and a destination location in absolute coordinates, and wherein the path is determined based on the current location and the destination location.

23. The system of Claim 21, wherein the processor is further configured to identify a destination location based on a predetermined mark, and wherein the path is determined from a current location to the destination location.

24. The system of Claim 17, wherein the processor is further configured to provide steering instructions to control the UGV in accordance with the path.

25. The system of Claim 21, wherein the processor is further configured to display a representation of the map including non-traversable cells, an indication of a location of the UGV and/or the path.

26. The system of any one of Claims 17 to 25, wherein the predefined distance is selected according to one of:

a. maximal distance expected to be travelled by the UGV between consecutive map updates;

b. a dimension of the area represented by the map; and

c. half of a dimension of the part of the area represented by the map.

27. The system of any one of Claims 17 to 26, wherein the predefined distance is determined in accordance with a relation between an update rate of the map, and a maximal or expected velocity of the UGV.

28. The system of any one of Claims 17 to 27, wherein the processor is configured to determine an area is a square having an edge of up to double the scanning distance of the scanning device, multiplied by the square root of 2.

29. The system of any one of Claims 17 to 28, wherein the scanning device is operable to repeatedly execute a scanning operation, the scanning operation comprises the scanning of the area surrounding the UGV, the area having predefined area dimensions.

30. The system of Claim 29, wherein the processor is configured to indicate

an obstacle detected during a first scanning operation on the map as a non-traversable cell, and to indicate a non-traversable cell representing an obstacle that is detected in the first scanning operation and is not detected in at least one subsequent scanning operation on at least one further map update.

31. The system of any one of Claims 17 to 30,wherein a dimension of each cell is determined in accordance with the dimension of the area squared, divided by a velocity of the UGV and multiplied by the drift value of the INS.

32. A computer program product comprising a computer readable storage medium retaining program instructions, which program instructions when read by a processor, cause the processor to perform a method of navigation a vehicle, comprising:

receiving scanning output data, generated by a scanning device located on-board the vehicle and operable to scan an area surrounding the vehicle;

using the scanning output data from a plurality of scanning operations, for generating respective mapping data representing at least a part of the area, the mapping data being relative to a location of the vehicle, wherein the mapping data comprises cells, each cell is classified to a class selected from at least two classes, comprising traversable and non-traversable, and characterized by dimensions larger than an accumulated drift value of an INS over a predefined distance; wherein non-traversable cells correspond to obstacles;

receiving INS data indicative of a current location of the vehicle relative to a previous location; and updating a location of the vehicle relative to the cells based on INS data.