CLAIMS

1. A method of autonomous path planning for navigating a vehicle, the method comprising while traversing an area using at least one computer processing device for:

receiving data indicative of: a map of the area, a starting point in the map, and a destination in the map;

generating a path leading to the destination:

determining a plurality of initial segments fanning out from the starting point in a first angular resolution, each of the plurality of initial segments proceeding at one of a multiplicity of directions;

if an initial segment intersects with an obstacle indicated on the map, determining additional initial segments fanning out from the starting point in a second angular resolution that is higher than the first angular resolution;

wherein each initial segment represents a respective path, giving rise to a multiplicity of paths;

assigning, a respective weight to each of the multiplicity of paths; and

selecting, a selected path from the multiplicity of paths in accordance with the weight;

while a stopping criterion has not been met, the stopping criterion is an elapsed time period:

determining additional segments fanning out from an end point of the selected path in the first angular resolution, each proceeding at one of a multiplicity of directions;

in case an additional segment intersects with an obstacle on the map, determining further additional segments fanning out from the end point in the second angular resolution;

adding additional paths to the multiplicity of paths, each including the selected path and one of the additional segments starting at the end point;

assigning a weight to each of the additional paths that does not intersect with an obstacle; and

selecting a selected path from the multiplicity of paths according to the weights; and

once the stopping criterion is met generating steering instructions for steering the vehicle in accordance with the selected path;

wherein the map is generated based on scanning data received from a scanning device mounted on the vehicle; and

steering the vehicle in accordance with the steering instructions.

2. The method of claim 1, wherein the selected path is selected as a path having a lowest absolute weight.

3. The method of claim 1, wherein the selected path is selected as a path having a lowest weight per segment.

4. The method of claim 1, further comprising:

determining a second selected path selected from a second multiplicity of paths, using another first angular resolution different from the first angular resolution, and/or another second angular resolution different from the second angular resolution; and

generating steering instructions for autonomously steering the vehicle along a path selected from the selected path and the second selected path.

5. The method of claim 4, wherein:

the first angular resolution and the second angular resolution are lower than the other first angular resolution and the other second angular resolution, respectively,

the selected path is selected from the multiplicity of paths in accordance with a lowest absolute weight, and

the second selected path is selected from the second multiplicity of paths in accordance with a lowest weight per segment.

6. The method of claim 4 further comprising: using a first core for generating the multiplicity of paths and a second core for generating the second multiplicity of paths.

7. The method of claim 4, wherein the weight assigned to each path of the multiplicity of paths is determined in accordance with smoothness of the path and proximity of an end point of the path to a destination.

8. A system for autonomous path planning for autonomously navigating a vehicle, the system comprising a computer processing device configured, while traversing an area, to:

receive data indicative of: a map of an area, a starting point in the map and a destination in the map;

generate a path leading to the destination, comprising:

generate a plurality of initial segments fanning out around the starting point in a first angular resolution, each of the plurality of initial segments proceeding in one of a multiplicity of directions;

in case an initial segment intersects with an obstacle on the map, switch from the first angular resolution to a second angular resolution and generate further initial segments fanning out around the starting point, the second angular resolution being higher than the first angular resolution; wherein each initial segment represent a respective path, giving rise to a multiplicity of paths;

assign, a weight to each of the multiplicity of paths;

select, in accordance with the weights a selected path from the multiplicity of paths;

while a stopping criterion has not been met, the stopping criterion is an elapsed time period:

generate additional segments fanning out from an end point of the selected path in the first angular resolution, each of the additional segments proceeding at one of a multiplicity of directions;

in case an additional segment intersects with an obstacle on the map, switch from the first angular resolution to the second angular resolution and generate further additional segments fanning out from the end point, in a second angular resolution, the second angular resolution;

add additional paths to the multiplicity of paths, each including the selected path and one of the additional segments starting at the end point,

assign a weight to each of the additional paths that does not intersect with an obstacle; and

select, a selected path from the multiplicity of paths according to the weights; and

once the stopping criterion is met, generate steering instructions for steering the vehicle in accordance with the selected path;

wherein the map is generated based on scanning data received from a scanning device mounted on the vehicle; and

steering the vehicle in accordance with the steering instructions.

9. The system of claim 8, wherein the computer processing device is configured to generate the plurality of initial segments fanning out around the starting point in a first angular resolution, by starting at one side and continuously proceeding toward an opposite side.

10. The system of claim 8, wherein the computer processing device is configured to generate the additional segments fanning out from the end point in a first angular resolution, by starting at one side and proceeding toward an opposite side.

11. The system of claim 8, wherein the computer processing device is further configured to:

generate a second multiplicity of paths, using another first angular resolution different from the first angular resolution, and/or another second angular resolution different from the second angular resolution, and selecting a second selected path from the second multiplicity of paths; and

generate steering instructions for steering the vehicle according to a path selected from the selected path and the second selected path.

12. The system of claim 11, wherein the first angular resolution and the second angular resolution are lower than the other first angular resolution and the other second angular resolution, respectively,

wherein the selected path is selected from the multiplicity of paths in accordance with a lowest absolute weight, and

wherein the second selected path is selected from the second multiplicity of paths in accordance with a lowest weight per segment.

13. The system of claim 12, wherein the multiplicity of paths and the second multiplicity of paths are generated by different cores.

14. The system of claim 8, further comprising or otherwise operatively connected to the system of claim 12, wherein the map is generated upon scanning data received from a scanning device mounted on the vehicle.

15. An unmanned ground vehicle (UGV) comprising the system for autonomous path planning for autonomously navigating a vehicle, the system comprising a computer processing device configured, while traversing an area, to:

receive data indicative of:

a map of an area, a starting point in the map and a destination in the map;

generate a path leading to the destination, comprising:

generate a plurality of initial segments fanning out around the starting point in a first angular resolution, each of the plurality of initial segments proceeding in one of a multiplicity of directions;

in case an initial segment intersects with an obstacle on the map, switch from the first angular resolution to a second angular resolution and generate further initial segments fanning out around the starting point, the second angular resolution being higher than the first angular resolution; wherein each initial segment represent a respective path, giving rise to a multiplicity of paths;

assign, a weight to each of the multiplicity of paths;

select, in accordance with the weights a selected path from the multiplicity of paths;

while a stopping criterion has not been met, the stopping criterion is an elapsed time period:

generate additional segments fanning out from an end point of the selected path in the first angular resolutions, each of the additional segments proceeding at one of a multiplicity of directions;

in case an additional segment intersects with an obstacle on the map, switch from the first angular resolutions to the second angular resolutions and generate further additional segments fanning out from the a second angular resolution;

add additional paths to the multiplicity of paths, each including the selected path and one other additional segments starting at the end point, assign a weight to each of the additional paths that does not intersect with an obstacle; and

select, a selected path from the multiplicity of paths according to the weights; and

once the stopping criterion is met, generate steering instructions for steering the vehicle in accordance with the selected path;

and

wherein the map is generated based on scanning data received from a scanning device mounted on the vehicle; and

steering the vehicle in accordance with steering instructions.

16. The method of claim 1, wherein the vehicle is an unmanned ground vehicle (UGV).

17. The system of claim 8, wherein the vehicle is an unmanned ground vehicle (UGV).

18. The system of claim 8, wherein the computer processing device include a first core and a second core, wherein the first core is configured to execute a first process that includes the generating of the multiplicity of paths and selecting the selected path and the second core is configured to execute a second process that includes generating a second multiplicity of paths and selecting a second selected path; wherein the second selected path is selected from the second multiplicity of paths generating using

another first angular resolution different from the first angular resolution, and/or another second angular resolution different from the second angular resolution;

the computer processing device is configured to generate steering instructions for steering the vehicle according to a path selected from the selected path and the second selected path.

19. The system of claim 8, wherein the computer processing device include a first core and a second core, wherein the first core is configured to execute a first process that includes the generating of the multiplicity of paths and selecting the selected path and the second core is configured to execute a second process that includes generating a second multiplicity of paths and selecting a second selected path; wherein the second selected path is selected from the second multiplicity of paths generating using another first angular resolution different from the first angular resolution, and/or another second angular resolution different from the second angular resolution;

the computer processing device is configured to generate steering instructions for steering the vehicle according to a path selected from the selected path and the second selected path.

20. The system of claim 18, wherein each respective first resolution and respective second resolution is unique.

21. The method of claim 1, wherein the further additional segments fanning out from the end point in the second angular resolution are added in a limited range around the end point; wherein the limited range starts, at or near the additional segment that intersects with the obstacle and ends at or near another additional segment that does intersects with the obstacle.

22. The system of claim 8, wherein the computer processing device is configured to add the further additional segments fanning out from the end point in a limited range around the end point; wherein the limited range starts, at or near the additional segment that intersects with the obstacle and ends at or near another additional segment that does intersects with the obstacle.

23. A non-transitory computer readable storage medium tangibly embodying a program of instructions that, when executed by a computer, causing the computer to perform a method of autonomous path planning for navigating a vehicle, the method comprising while traversing an area using at least one computer processing device for:

receiving data indicative of: a map of the area, a starting point in the map, and a destination in the map;

generating a path leading to the destination, comprising:

determining a plurality of initial segments fanning out from the starting point in a first angular resolution, each of the plurality of initial segments proceeding at one of a multiplicity of directions;

if an initial segment collides with an obstacle indicated on the map, determining additional initial segments fanning out from the starting point in a second angular resolution that is higher than the first angular resolution;

wherein each initial segment represents a respective path, giving rise to a multiplicity of paths;

assigning, a respective weight to each of the multiplicity of paths; and

selecting, a selected path from the multiplicity of paths in accordance with the weight;

while a stopping criterion has not been met ,wherein the stopping criterion is an elapsed time period:

determining additional segments fanning out from an end point of the selected path in the first angular resolution, each proceeding at one of a multiplicity of directions;

in case an additional segment intersects with an obstacle on the map, determining further additional segments fanning out from the end point in the second angular resolution;

adding additional paths to the multiplicity of paths, each including the selected path and one of the additional segments starting at the end point;

assigning a weight to each of the additional paths that does not intersects with an obstacle; and

selecting a selected path from the multiplicity of paths according to the weights; and

once the stopping criterion is met generating steering instructions for steering the vehicle in accordance with the selected path;

and

wherein the map is generated based on scanning data received from a scanning device mounted on the vehicle; and

steering the vehicle in accordance with the steering instructions.